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## ART. I.—TARIFFS AND MANUFACTURES.

BY J. C. DELAVIGNE, ESQ.

When the so-called American system was established, it was an experiment. The effects of it have been sufficiently marked to afford a proper appreciation of its merits. Its establishment was due in part to the eloquence of its founder and to the influence of the class and section whose interests it was calculated to advance. One of the features that recommended it was the facility which it afforded for raising a public revenue. That it is an insidious scheme for taxing one portion of the community at the expense of another, is so glaring, that it requires but a moment's consideration to be perceived. This has been a strenuous and persistent argument against it by those who opposed it. It was overruled by considerations of public benefit, as was alleged.

One of the leading arguments in its favor was, that by protecting manufactures, and enabling them to compete with cheap foreign products, they would, when fully organized and established, and have obtained a sufficient amount of trained labor and artists, be able to sell their manufactures as cheap, if not cheaper, than the foreign products. It has proven a woful disappointment to the consumers, on the one hand, and on the other hand, it has, at their expense, enriched the manufacturers. It could not be

foreseen that the imposition of the tariff tax would just raise the price of the article taxed to an amount equal to the tax ; but it was not as well foreseen that it would not prevent the importation of the foreign products, because, as the foreign product would sell for just as much more as the amount of the tax, it could still be imported to compete with the home manufacture. Then, one of the leading arguments in favor of the American system fails, when it is seen that it has not accomplished what was claimed for it—to make home manufactured products as cheap, or cheaper, than the foreign. It is true, however, that it has produced trained labor. But, if it be considered what an enormous amount of tax has been paid for it, it may well be doubted if it has not cost more than it is worth, and we must accept it as the only consolation left in lieu of the great public benefit it was expected to confer.

When the tariff was established, certain portions of the United States were the principal consumers of imported commodities. Hence their opposition to it. They alleged that the tax was unfair and unequal, because they were consumers, and other portions, being manufacturers, were benefitted at their expense. Their antagonists had a very ready answer to their objections, that competition was open to all—as well to one section of the United States as another. That seemed to be an unanswerable and knock down argument. But it was not true that competition was open to all, and it was not fair that the peculiar manufacture consumed by one section should be selected for taxation in preference to another. Competition was not open to all, for various reasons. In the South slave labor was not of that intelligent character suited to manufactures ; the Western and Middle States were comparatively new States, whose population was sparse ; cheap labor for manufacturing purposes could be obtained only in agglomerated centres, where population was dense. This occurred only in New England. Labor was dearer in the South and West. The country was new and undeveloped, the lands were rich and fitted the country for agriculture. In New England the lands were unfitted for agriculture, and never did, nor never can produce enough food for the population. Under these circumstances, competition was not open for all, and the argument was fallacious.

Wayland's recent work on political economy, pages 132, 152, re-

futes triumphantly the arguments in favor of the American system. It might, however, have gone further in refuting another plausible, but specious, argument: the advantage to the country of established manufactures in case of war. For example, iron and its manufactures for war purposes, for arms, etc., medicines, clothing, and other articles of use and necessity. It is alleged that, in case of war, the nation would be deprived of this if she depended upon foreign countries for them. One of the most important items is that of arms and those things necessary for the construction of vessels of war.

It will be necessary to examine how these inconveniences could be avoided, and if it would be prudent to make an important change in the manufacturing industry of the country.

As for arms and vessels of war, there is one fact worthy of notice, and which seems a fair answer on this point. It is, that the United States are now manufacturing these materials of war for foreign countries, and supplying them in large quantities. The reason for it is probably the superiority of American manufacture and skill of the workmen. If it should be said that this is one of the effects of the system of fostering manufactures, the allegation might be admitted for the sake of argument, and what then? That it has answered the purpose which was intended. If it has accomplished the end, there is no further reason for the continuance of protection. If the United States can manufacture for foreign countries, *a fortiori*, they can do it for themselves. The argument is the same as regards other articles of iron manufactures, as far as the Government is concerned, or the possibility of supplying the wants of the country in case of war; with this difference, however, that the consumer here has to pay one half more than he would if he could import free of duty. If, as it has been admitted, the system of protection has produced its effect in relation to the manufacture of arms, so it must be admitted that it has also produced its effects in the manufacture of other articles of iron. The American articles in that line are equal to the foreign, generally, and, in some instances, superior. Therefore, as the manufactures of the country can supply what may be wanted for government purposes or for the use of the people, there is no further necessity for the continuance of the protective system.

The same argument applies to all other manufactures. But, if it should be thought good policy to continue the protective system, it would be much more just and fair to all persons and all sections, as Wayland justly observes, to establish bounties, which would have the same effect in stimulating manufactures as tariff duties, which, in some cases, are so high as to amount almost to a prohibition. The general tax imposed for the purpose of raising money to pay the bounties would be borne by all equally, instead of falling, as it does under the tariff system, entirely upon the consumer. If such a tax was imposed on real estate, it would fall upon those the best able to pay it, because it must be supposed that the possessor of real estate is richer than he who does not possess any, and that he consumes more commodities. If the bounty be given for exportation, as the English do, it would produce the same effect in stimulating manufactures, and would not enhance the cost of the article to the consumer. It would create a carrying trade, and operate to the benefit of the shipping interest. Such a tax would be incomparably less than the enormous amount of duties paid now by the consumer, added to the enhanced price which he pays for home manufactures. Suppose, for example, the man who buys in one year the value of $200 in clothing, on which the duties amount to $100; if the same man was taxed one tythe of it, the amount would be amply sufficient for bounty purposes, and he could buy the same amount of clothing for one-half the price. Or, consider the case of the poor man who is obliged to stint himself and family on account of high prices, if otherwise, he could be comfortable if he could buy cheap. To consider the matter in still another light: The Government could, with much less taxation, lay up supplies in anticipation, sufficient for any contingency; or it could establish its own peculiar manufactures. The next question to consider is the case of war, which would cut off foreign supplies of articles not considered as war necessities, such as clothing and articles of fancy and luxury. In this respect, it may be observed, that since the introduction of steam vessels in place of sail, blockades partake more of the nature of paper blockades than heretofore. The principal effect would be to raise prices, on account of the difficulties that would be incurred in trade and commerce. A late and familiar example is what occurred in the late war. Aside from this,

the country possesses all the necessary materials, machinery, and workmen, for the manufacture of everything it may come to need, and can always turn to the manufacture of such commodities, even in the face of an enemy. The country is large, and there are inland places inaccessible to an enemy. It is isolated, and can be attacked only by sea ; its manufactories of materials of war, or other necessities, could not be interrupted.

One of the objects of the above remarks is to show the propriety of reducing the price of living, with a view to the comfort and wellbeing of the people generally, and of recuperating their fortunes after the effects of the dreadful war through which we have just passed. Some few persons, perhaps many, have been enriched, whether legitimately or not, need not now be inquired into, but the great number and majority, South, and North, and West, have suffered in life and property. It is the duty of the Government to provide for the comfort and wellbeing of the people, without regard to the acts, faults, or omissions of those who have preceded in its administration, or in what manner the misfortunes have been entailed upon the country. We were one people, should be one people, and we are one people. We should look to the future and not to the past. There is one important fact that we cannot ignore, that the necessaries of life have, of late, been greatly enhanced, and out of proportion with the wages of labor. We can find the cause in either the increase of money, or the depreciation of our currency, or the restrictive system and high tariffs. What we want now is the means for enterprise, and the means to labor and make it profitable. One of the first means for such an end is to reduce the cost of all sorts of necessaries and supplies, and this can be attained measurably by free trade. Let us buy where we can buy cheaply, and have every facility for selling our products or exchanging them to advantage. We should have cheap freights and travel ; it is by trade and exchange that people are enriched ; exchangeable products are the only source of our riches. If we can import freely, we will produce the articles of export for exchange. It will revive our shipping interest. Our merchant marine was the finest in the world. It has almost disappeared from the ocean. It is not being rebuilt, because of the exorbitant price of labor and materials. Why are materials dear ? Because the labor to produce them is

dear, and they cannot be imported on account of the high duties. Why is labor dear? Because by our artificial system the commodities of life are more costly, and there must be a corresponding increase in the wages of labor to establish the proper relation between them. Is it not an error that the laborer is benefited by high wages? Is it true that low wages operate to his advantage? If wages are increased, the product of labor is increased relatively, just as a tariff tax enhances the price of manufactures. If wages are low, the product of labor is cheap in due relation; if duties are taken off, the manufactured products are diminished to the amount of the duty. It is, then, of no advantage, either to the laborer or any one else, that the wages of labor should be high, and the prices of commodities also high. But it would be greatly to the advantage of the ship building interest that labor, and commodities, and building materials should be cheap. Then we might compete with foreign countries in the carrying trade, and in ship building. We would have more exchangeable products to carry if production was encouraged or let alone, instead of being taxed; we would import more foreign products if duties were abolished, and make business for our shipping. Whom does it benefit to have a tax on salt? A few manufactories. On whom does the burden fall? Upon all, to the detriment of an extensive trade in preserved provisions; to the detriment of a natural product being converted into one of trade, export, or exchange.

There can be no doubt that the abolition of restrictive duties would operate to the relief of all, and in lieu of it the imposition of uniform and equal taxes.

Is there any doubt that it would largely increase the amount of trade and commerce—that it would tend to the increase of the production of exchangeable products, and confer on them a greater value? Can it be doubted that trade and commerce has enriched every nation that has carried it on? England did not get rich on the East India trade by high tariff duties. Neither did Holland or the other nations who have participated in that trade. To have trade we must abolish duties; to have ships we must have trade; to build ships we must have cheap labor and cheap materials; we must reduce the price of commodities and the necessaries of life for the laborer; he must have a free market for the produce of his

labor. With the contrary system, every foreign nation will outstrip us in every enterprise ; their dollar is now worth nearly two of our dollars ; we are not richer from that fact.

There are some important facts in our present situation, making it so different from what it was before, that they should be borne in mind in the consideration of measures of a national interest.

Our population is becoming more dense ; immigration continues, and is on the increase ; our cities and towns are becoming more populous ; our system of labor in the States producing the greatest amount of exportable products is greatly disordered, and it is yet a problem if, or when, it may be restored. Many improvements have been made in the mechanical arts ; the system of warfare has been changed ; arms are different and more destructive ; a complete revolution has taken place in war and commercial vessels ; sailing has become too slow ; we must have steam, although at higher rates ; new wants have been created ; old forms and customs have become obselete, yet, shall we trudge on in the same beaten track, now leading us astray ? Shall we ignore the lessons of experience now overtaking us ? The new state of things is common to the whole country, but particularly important for the South, in a national point of view as well as a local one. We should endeavor to promote the development and production of exportable products—in the South, cotton, sugar, tobacco, and the products of the forest ; in the West, grain and provisions—create business for a carrying trade ; leave to each section the peculiar industry for which it is the best fitted.

In the South, heretofore, its peculiar system of labor was better suited to certain productions than white labor would have been. An important change must, of necessity, take place. There will be considerably less of negro labor, and considerably more of white labor. The diminution in negro labor arises from decrease of numbers, in comparison with *ante bellum* times, and an indisposition to work. White labor has increased in many instances from sheer necessity ; in other instances it has been induced by the great enhancement in the price of products. Negro labor was suited to simple and inartificial agricultural production of a few staple crops. White labor will admit of more diversified products. Many of our staple products can now be converted into simple manufactures,

and thus give occupation to all capacities for labor—the strong, the weak, the old, the young. Our cotton can be converted into yarn at the gin; the heavy goods can be manufactured of the same class, of better quality. Heavy woolen goods, leather, and all bulky and cheap articles that cannot bear heavy expenses of transportation, are the class of manufactures suited to the South. These need no protection, or if they do, let the system of bounties be established universally. For all this, cheap labor is necessary. The laborer has been inadvertently seduced and led away by the attractive name of high wages and short hours. He can now see the consequences. High wages have made high commodities and high living. The cost of living, according to a late census, has increased 75.70, and the increase of wages has been only 58.70. It follows that the laborer is impoverished—he has to give more labor to sustain life than he did when labor was cheap. By raising the price of labor artificially as we have been doing, it has not been made more profitable for the laborer. We are all the time diminishing our chances of competing with foreign nations in our products. We cannot undertake to export calico to foreign countries at fifteen cents per yard when other nations meet us there with calicos at ten cents. We cannot compete for the carrying trade when our ship will cost $80,000 to build and their ship costs but $40,000. When we tax cotton, are we not helping the English nation to produce cotton in India? They are spending enormous amounts of money for the encouragement of the production of cotton in every country in the world susceptible of producing it. By stimulating a large production of cotton, they expect to reduce the price of it, and have cheap cotton to make goods to undersell their neighbors. It seems to be good policy for them. Why the reverse of it should be good policy for us is hard to understand. The South has the unexceptionable climate and soil for the production of cotton, and is susceptible of producing at least four times as much as it ever has produced, but whether it be good policy to stimulate production to that extent is very questionable. A diversity of labor makes labor much less onerous. These, and many equally as profitable products requiring much less labor, many of them requiring only such exertion as might rather be called recreation and exercise than labor. The orchard, the vineyard, the silk worm, the beehive, the raising of sheep, and other small

stock, some limited manufactures. The resources of the South offer the richest field for enterprise ; the people are poor ; they offer to sell their lands cheap ; they invite immigration, labor, and capital. For the good of new comers and old denizens, burdens should be taken off ; they should have free trade, cheap commodities, less taxation and arbitrary government. The freedman should not be forgotten ; he is relatively poorly paid, and one reason of it is the unreliable character of his labor ; his improvidence is proverbial, his necessities are great, and everything he has to buy for sustenance or comfort is very dear. If the prices of commodities that he needs were reduced and brought to a relative proportion to the prices of labor, it would operate to his benefit and to the advantage of his employer.

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## ART. II.—BRITISH HONDURAS.

### ITS HISTORY, TRADE AND NATURAL RESOURCES.

BY MR. CHIEF JUSTICE TEMPLE.

(Continued.)

The town of Belize occupies a space of at least two miles in length. Before the recent fire, which consumed so many buildings, there were, at the lowest computation, fifteen hundred houses. Those which are occupied by the most respectable portion of the inhabitants, are, for the most part, large and elegant structures, having in front spacious verandahs. There are two pretty little churches, a Baptist chapel, a Presbyterian chapel, a Wesleyan Methodist chapel, and there was, but it has unfortunately been burnt, a Roman Catholic chapel. It has been said that Honduras is only capable of producing mahogany and logwood. Why, the very fact of mahogany growing in such abundance is the strongest proof of the fertility of the soil. The mahogany tree will not flourish except in a dry, rich soil, and this again proves that Honduras is not wholly a swamp. Wherever mahogany will grow, there every tropical product will flourish ; wherever logwood grows, there you can produce the finest rice. I will now proceed to mention a few vegetable products, besides mahogany and logwood, which not only *can* grow, but *do* grow in Honduras. Captain Henderson, the intel-

ligent writer from whose book I have before quoted, says: "Few countries, perhaps, ever possessed higher advantages than the greater part of that which is placed contiguous to the Bay of Honduras. It is certainly but imperfectly known to us, but what has been ascertained respecting it discovers in a very striking degree the vast obligation it owes to nature, if it be not in any way beholden to the industry of man. The extraordinary benefits which might result from the happiest combination of climate and soil are almost disregarded, and the cultivation of the earth, which in almost every other spot of the habitable world claims our first regard, is here held of no consideration at all. Pursuits, therefore, of the most important utility give place to those which are viewed as being infinitely more profitable. Nor is it probable that such resources will suggest themselves until the opportunities afforded by the latter shall begin to fail. This must happen, and it will be only then that the real value of this country can possibly be discovered."

The cocoa-nut tree, of course, grows in Honduras, and can be cultivated to any extent. This tree will flourish in the most sterile soil. Where nothing else will grow, where not a blade of grass can be seen, this tree, crowned with its broad, plume-like, drooping branches and pendant clusters, bends its tall stem and courts the breeze. It is about eight years in arriving at maturity. At the expiration of that time it is in full bearing. The average value of a cocoa-nut tree is three dollars per annum. If a person, threfore, chooses to plant a thousand cocoa-nut trees, which is the easiest thing in the world to do, at the end of eight years he will possess a secure income £600 per annum. The great importance of the cocoa-nut tree has been long recognized. From the kernel of the nut a valuable oil is made, which is now much used in the manufacture of candles and soap, and from the husk a species of fibre is made, which has, within the last few years, been successfully employed in the manufacture of matting. This fibre is also frequently used in the stuffing of mattresses and cushions, for which it is an excellent substitute for horse hair. It is equally elastic, though not so durable. But its cheapness recommends it as an article of commerce.

There is another species of palm in Honduras, called the mountain cabbage. This tree grows to the height of 100 and 120 feet.

The stem is quite smooth and perpendicular, and, like the cocoa-nut, the branches droop gracefully from the top. There is a singular feature in this tree, which I have not noticed in any other of the palm tribe, the stem, from the bottom to the top, is surrounded with a succession of rings of a darker colored bark. Until the tree has arrived at its full growth, its age can be ascertained by the number of rings which it possesses. The topmost portion of the tree is a delicious esculent. It is perfectly white, and is, in appearance very like the tusk of an elephant. It consists of a number of thin, crisp laminæ. When this is boiled it resembles, both in appearance and taste, the Jerusalem artichoke. It also makes an excellent pickle. But to obtain the cabbage it is necessary to cut down this beautiful tree, which is sometimes too great a sacrifice for one dish. But the most valuable tree in British Honduras is, unquestionably, the cahoun palm. The branches of this tree resemble those of the cocoa-nut, but instead of growing from the top they shoot up and radiate from the bottom. It does not grow so high as the cocoa-nut tree, and the stem is considerably thicker. It bears a nut about the size of an egg, which grows in large bunches, which, from their size and weight, remind one of those ancient Dutch tiles, on which were represented the Hebrew spies, bending under the ponderous clusters of the promised land. The oil which is made from this nut is very much superior to the oil of the cocoa-nut. A pint of the former will burn as long as a quart of the latter. The one congeals at a temperature of 72½ degrees, the other at a temperature of 68 degrees. The cahoun tree, which will only grow in the richest soil, abounds in British Honduras, though it is not found in any of the West India islands, and Sir William Hooker informed me that it was not known in Europe until I sent it from this country. Sir William Hooker planted some of the nuts which I forwarded to him at Kew, two of which have germinated, and are likely to do well. Mr. Taber, the Crown Surveyor of British Honduras, a very intelligent gentleman, who thoroughly knows the country, thus writes about the cahoun tree: "By the latest computation, the settlement of Honduras contains 37,500 square miles, of which I do not hesitate to assert two-fifths are composed of what is commonly called here cahoun ridges, (corossales in Spanish.) These corossales, or cahoun ridges, are mostly along the tracks of rivers, and possess the richest virgin

soil. Some of them are only a quarter of a mile deep, while others extend to from twelve to twenty miles in depth. The cahoun trees grow at an average distance of five yards from one another, thereby forming arches of evergreens, which soften the rays of the tropical sun, and give a majestic air to those forests whose silence is only broken by the twitter of bright plumaged birds or the solitary cries of some wild animal roaming in these wildernesses. These cahoun trees yield one crop every year; this crop consists of generally three, and sometimes four, bunches of nuts, as close together as grapes; the nuts are of the size of a small turkey's egg, and on an average there are eight hundred nuts in one bunch. The people here extract oil from them in the following manner: When the nuts are what they term full, they break between two stones the shell, which is very hard, then pound the kernel in a wooden mortar; the sediment is then put into a boiler with water, and boiled down until all the oil, or fat, floats, they skim the oil off, fry it in an iron pot, so as to disengage all the aqueous particles, and then bottle it. By this simple process the average yield is one quart bottle of oil out of one hundred nuts."

The general manager of the British Sperm Candle Company, Fairfield Works, Bow, thus writes respecting the cahoun oil in the *Scientific Journal:*

"I have formed a very favorable opinion of the value of the cahoun-nut oil, (of which you were so kind as to send me a specimen) as regards its application to the manufacture of candles. I forward to you herewith a pair of candles which contain fifty per cent. of the oil, and having burnt another, I find that the light is white and steady. I consider the cahoun-nut oil superior to cocoa-nut oil for making composition candles, for the odor is more pleasant and the compound less oily. The best cocoa-nut oil is now selling in London at £2 11s. a cwt., and I think there would be no difficulty in selling the cahoun oil at a higher rate in very large quantities."

I have received the following testimony to the merits of this oil from Mr. Wilson, the scientific director of Price & Co.'s candle works:

"JANUALY 2, 1867.

"*My Dear Sir*—We have now the pleasure to send you the result of a few experiments made to ascertain the exact commercial

value of cahoun oil, which we find to be that of the highest quality of cocoa-nut oil, that which comes from the Malabar coast, and is selling at the present time at £51 10s. per ton. We send you specimens of the oil separated into its liquid and solid constituents, *coceinine* and *oleine*, and a little of the oil made into soap, which has all the very peculiar and characteristic properties of soap made from cocoa-nut oil. You may now rely upon cahoun oil being marketable in this country in *any quantity* at the price of the finest and purest cocoa-nut oil. Yours, etc., "G. F. WILSON.

"R. TEMPLE, ESQ."

The shell, which is very hard, and admits of a fine polish, might be made use of for various ornamental purposes.

The Palma Christi, or castor oil plant, grows wild in Honduras. When it has once got into your grounds it is almost impossible to extirpate it. The cultivation of this valuable product would not, then, be a matter of any difficulty, and any amount of the oil could be sent into the British market. Mr. Wilson informed me that he would give from £40 to £50 a ton for as much castor oil as could be sent to him, and he stated that by expending £1 upon every ton, he could make it as good as cocoa-nut oil for the manufacture of candles. The Creoles use castor oil for their hair, the growth and lustre of which they imagine it promotes. Elliott Warburton, in his "Crescent and the Cross," ascribes the luxuriance of the long, dark, clustering curls of the Nubians to the use of it.

The Cayenne pepper which is made in Honduras is very superior to that which is made in Jamaica, being manufactured of the small red, bird pepper, without the addition of any other material. The Jamaica pepper is adulterated with a fine red powder, which is found upon the anotta plant.

The ginger of Honduras is considered to be very good, being singularly free from that fibrous quality which characterizes the East Indian ginger, at least that which is imported into this country.

I have already said that where logwood will grow, there also excellent rice may be produced. I sent a specimen of this product of Honduras to this country, and it was pronounced to be equal to the best Java rice.

Much has been said and written of late about the desirableness of

producing cotton by means of free labor, and Dr. Livingston has drawn the attention of the public to certain portions of southern Africa, where that article could be grown in perfection. Now, I will undertake to say that there is no country under the sun more favorable to the cultivation of that plant than British Honduras. In the year 1846, Mr. James Banks read to this society a paper upon Honduras cotton, when he exhibited a number of specimens. In the published transactions of this society, it is stated that "among the samples exhibited to the society were the following from Honduras: The clustered or kidney seed, showing its clustered form and staple, sold at 6d., and valued on trial, in 1841, at 6¼ d.; also a native cotton, resembling sea island, which, when saw-ginned, was valued by the same spinner at 6¾d. The seed of it is almost entirely free from down, and therefore capable of passing easily through the roller gin, and bringing a much higher price. A specimen of the Anguilla, grown in British Honduras, is one of the very finest cottons known. Its seed is entirely free from down, easily separated, and therefore readily cleaned by the roller; its seed was the smallest among the samples. There are other kinds (indigenous to Honduras) which are fine, but covered with down, rendering them difficult to clean, except by the saw process; one kind is of a grey color, another is red, furnishing the cream colored cotton."

It is not necessary, I think to penetrate into southern Africa to cultivate a plant by means of free labor, in order to diminish the consumption of that which is produced by the slave, when we are able to grow as good an article in one of our own colonies as that which is imported from the United States.

Tobacco, the narcotic odor of which, it has been said, equally infatuates the ignorant savage and the intelligent philosepher—tobacco which solaced the mind of the scientific Newton, soothed the learned Parr, and taught the fictitious Syntax to bear and forbear when he had returned from his tour with empty pockets, and was soundly rated by his indignant spouse—tobacco grows spontaneously and abundantly in every portion of British Honduras. Tobacco was first discovered by the Spaniards in 1560, in Tobasco, whence it was sent by them into Europe. Formerly a very extensive trade was carried on between Havana and Yucatan, the latter supplying that city with logwood, salt, deerskins, a fibre from which ropes and

hammocks were made, and tobacco. When the planters in Cuba were able, by careful and skillful cultivation, to produce a better tobacco than that with which they had been supplied from Yucatan, that article ceased to be a branch of the trade. It is not to be supposed that the Spaniards, when they discovered the plant, also discovered the use of it. It had long been used by the aboriginees, who regarded it with superstitious reverence. It was called yoli by those who dwelt in the islands, and pætur by those who inhabited the continent. There is a considerable quantity of tobacco now cultivated to the north of Belize river. When the Indians fled from Yucatan to Honduras, they in a very short time proceeded to plant the tobacco, for the Indian still considers that herb as a special gift of the Deity to solace him in trouble, to tranquilize him in prosperity, and to fill him with soft and gentle feelings. He thinks, when he kindles the dried and folded leaf, he is sacrificing to his God—that every puff of smoke is an incense of adoration, and that the stupor which steals over his senses is the heavenly calm enjoyed by blessed spirits. Very good cigars are manufactured at Merida, the capital of Yucatan, and also at Zacapa, in Guatemala, where they are scented with vanilla. I have no doubt, if knowledge and skill were brought to bear upon the cultivation of this plant, as good tobacco might be produced in Honduras as that grown in Cuba.

(To be continued.)

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## ART. III.—MAN AS THE COTEMPORARY OF THE MAMMOTH AND THE REINDEER IN MIDDLE EUROPE.

TRANSLATED BY C. A. ALEXANDER, FOR THE SMITHSONIAN INSTITUTION,

*From "Aus der Natur: die neuesten Entdeckungen auf dem Gebiete der Naturwissenschaften." Leipzig,* 1867.

Assuredly we do not mean to claim for these delineations anything like uniform merit, or an exact appreciation of characteristic peculiarities; the figures present sometimes but a stiff and wooden appearance, and we are even left in doubt whether we have before us an ox, a horse, or a reindeer. It is, however, but just to say that such enigmatical figures are fragmentary only, and we should doubtlessly recognize them more readily if the picture had remained entire. Most of the figures, on the other hand, evince no mean facility of the artist in seizing on distinctive traits, so as to enable

us at the first glance to determine the species ; though, of course, there can be no question here of finished execution, but merely of a successful rendering of the most essential details ; the characteristic outline conveyed in a few simple strokes. The reindeer, horse, bison, steinbock, elephant, are not to be mistaken, and even the peculiar mode of movement of each of these animals is rendered with great truth. In these cases a certain freedom of execution is often exhibited which could only have been acquired by much practice. Now, it is precisely this freedom in the representation of motion which has inspired many with doubt as regards the authenticity of these relics ; it indicates, they argue, an advanced stage of art, long observation, and persevering practice of the eye and hand, to render such representation possible, and if the saints and madonnas of the first Christians are commonly stiff and clumsy, certainly the products of prehistoric art must be expected to betray this character. Admitting these views to be somewhat plausible, we may yet venture to oppose to them the fact that the earliest attempts of Greek sculpture are particularly distinguished by the characteristic conception of motion ; that in the group of the Æginetes, for instance, the movements of the figures in battle are rendered with great felicity, while the expression of the faces is wholly slighted. It is altogether the same in the present instance. The art of the reindeer period had advanced so far as to be capable of manufacturing a stone dagger whose hilt represents a reindeer in the act of springing ; the horns and extremities are creditably executed, and the movement is perfectly represented ; but the skill of the artist has failed in giving an expression of reality to minuter features.

It may be regarded as characteristic also that these representations, where they occur on fragments of some size, always place before us a number of animals of the same species, and disposed in such a manner as is usual when they move in herds, being sometimes wide apart, and sometimes so closely crowded that the body of one covers more or less that of another. Since attention was paid to this rule of representation, it has been observed that, on the celebrated mammoth piece hereafter to be noticed, there are certain strokes which, besides the principal animal, indicate two others of the same species.

If these representations are in themselves highly worthy of our attention as art-productions of the earliest times, they are even more so in reference to the objects represented, for these afford us a criterion of the methods of inquiry heretofore followed in regard to the animal bones which have been exhumed from the caves. To many, who want confidence in the rigorous procedures of comparative anatomy, it may perhaps have seemed presumptuous that a savant, having before him only a joint of the foot, the end of a bone or a tooth, should pronounce authoritatively that here a reindeer and not a hart, that a bison and not a common ox, has existed ; but when, as now, a verification is afforded by an exhibition of the entire animal form in its sculptured representative, when it results

from this that he who carved it on the horn must have known the animal, and accurately known it, in order to portray it in its proper shape, all doubt must vanish. The bones of the reindeer and bison could not have been washed hither in a deluge from the far north and deposited in the southern cavern, as has been pretended ; the animal must there have lived in its flesh and blood where to-day we find its bones and its sculptured figures. Let us see what were the species known at present to have been thus represented.

Among these the reindeer is by far the most frequent, while its antlers have in great part furnished the material on which the representation is carved. The form of the head and horns and the hair of the neck leave no doubt in the determination of the species. The stag, which occurs more seldom, admits of easy discrimination. Next follows the horse, evidently of a race with short, thick head, short neck, compact body, strikingly similar to the northern race of our own times. He that has once seen the Iceland horse, as it roams at large in it native island, will here instantly recognize the original pattern.

On the piece on which is represented the man with horses and an eel, we see on the other side two heads of bisons, which are perfectly characterized by the profile of the forehead, the insertion and curvature of the short horns, and the profuse crinosity of the neck and head. The bison or aurochs therefore flourished here in companionship with man, the horse, and the reindeer. Another figure, which unfortunately is mutilated, but is distinguished by the fineness of its hair, seems to point to another of the bovine species differing from the bison ; nor is this a matter of surprise, since the testimony of the bones is to the same effect. An animal of the goat kind, probably the steinbock, is not wanting, while some other figures of horned and graminivorous species must be acknowledged to be deficient in point of distinctness.

The most remarkable relic, however, is the representation of the primeval elephant, a real mammoth, on a plate of ivory, which formed part of a tusk of large dimensions. In May, 1846, M. Lartet, in company with Dr. Falconer and Verneuil, both well-known naturalists, caused excavations to be made in the stratum of the Madelaine. "At the moment of our arrival," says Lartet, "the laborers disinterred five fragments of a rather thick plate of ivory which must have been detached, ages before, from a large tusk. After having fitted the pieces together by their corresponding edges, I pointed out to Dr. Falconer numerous scratches and lines somewhat deeply engraved, which, on collocation, constituted an animal figure. The practiced eye of the distinguished paleontologist, better versed than any one else in the study of elephantine animals, at once recognized the head of an elephant. He then directed our attention to the other parts of the body, and especially to certain tufted lines in the region of the neck, denoting the characteristic mane of the mammoth or elephant of the glacial era. It is generally known that this peculiarity which marks the arctic habitant of the animal, was verified, in the year 1799, by Adams, a

member of the Academy of St. Petersburg, in the carcass of such an elephant, found imbedded in ice near the mouth of the Lena. A bunch of its hair is still to be seen in the geological collection of the Garden of Plants at Paris.

"I have shown the piece in question to competent observers, such as Milne Edwards, de Quatrefages, Desnoyers Longperier, and Franks, director of the London Antiquarian Collection; and the latter has, by means of the pencil, rendered the characteristic lines more distinct in the plaster cast which had been taken of the object.

"This new fact only tends to strengthen the conviction already required of the existence of man at the same time with the mammoth and the other large graminivorous and carnivorous beasts which, according to the geologists, lived in the first section of the quaternary period. The truth of this historical fact results from so many concurrent observations and from material facts of such plain import, that even the most prejudiced cannot fail to recognize its entire validity, if they will permit themselves to see and judge with ordinary conscientiousness."

The elephant, thickly clad with hair on the neck, forehead, and breast, is seen in profile and at its full length in the act of striding forward. At first it was not rightly known what was to be made of a tuft of hair and certain marks which are seen to the left in advance of the line which forms the profile of the forehead. Repeated and closer scrutiny of the fragment has enabled us, in the end, to recognize therein the eye, the outline of the forehead, together with the proboscis of a second elephant, which is advancing close by the side of the first. Some lines on the leg would lead us to conjecture a third elephant, which followed on the part of the plate which is broken off. The drawing of the figures is executed with a free and bold hand, and the characteristic movement of the elephant, which raises simultaneously the legs of the same side, is well preserved.

Another memorial of the art of this ancient epoch is an elephant's head carved on a reindeer's horn, which was also discovered in Perigord by the Marquis de Vibraye. These two relics are the more interesting as furnishing the proof that man actually existed as the cotemporary of the mammoth or gigantic elephant, a fact which has been so often and so obstinately contested. But since the localities where these objects of primitive art have been found unquestionably belong to the reindeer period, it is conclusively shown that some of the mammoth species survived to that time.

It is rather remarkable that as yet only a single delineation has been found which can be interpreted as relating to the bear, being the head of that animal, while the rest of the carnivora are wholly unrepresented. That representations of the unavoidable struggles of man with these animals should not have been left behind is scarcely to be believed, especially when their teeth, pierced with holes and destined for suspension as trophies, bear unequivocal testimony to such encounters. Birds and reptiles have not hitherto been found represented. Fish, on the other hand, are very frequent,

and can, for the most part, be recognized as belonging to the carp family, which still frequents the fresh water of the region. We meet with no trace of marine animals; the men who lived in Dordogne at the era of the reindeer seem to have known nothing of the sea and its inhabitants.

These objects of art have been found only in the three grottos of *Les Eyzies*, *Laugerie-Basse*, and La Madelaine, in the department of Dordogne. The first of these is high and wide enough to enable the light to penetrate throughout, being 12 metres deep, 16 broad, and 6 metres high; it appears to have been used in the middle ages as a stable for horses. When Lartet and Christy began their explorations, the grotto had been considerably enlarged and deepened by earlier occupants, though the explorers found at the bottom a compact floor, from which projected masses of blackish stalagmite, flint instruments, stones, and pieces of bones; this bone-breccia lay immediately on the rock floor of the cave, and showed a thickness of one to three decimetres. Large pieces were broken loose, which were sent partly to differents museums, but in greater quantity to Paris, with a view to more exact examination. The station of Laugerie-Basse is partly in the hollow of a rock, whose face is 100 feet high, while a part of the formation, on which appeared traces of an ancient fire-place, extended outwardly in front of the cavern. Within, the breccia was full three metres in depth. The neighboring station of the Madelaine lies at the foot of the rock, and forms a decayed heap 15 metres in length, 7 in breadth, and 3 in depth, in which some human bones were found, but unfortunately not complete enough to indicate the race of men from whom they proceeded. Some fragments of blood-stone and a coarse stick or pencil of ochre leave it to be inferred that in that distant age colored drawings were sometimes executed.

Thus we see how civilization was undergoing a slow but constant development among the oldest inhabitants of middle Europe. The facts which the excavations of Chaleux have disclosed, in connection with those discovered in the grottos of Furfooz, furnish a picture of the first age of mankind in Belgium. These old populations, with all their usages, reappear before us, after having been many thousand years forgotten, reminding us of the fabulous bird which sprang with renewed life from its ashes. So the primeval age of mankind is rebuilt from its own ruins.

We see them in their dark, underground retreats surrounding the primitive hearth, shaping with some skill and greater patience their weapons from flint-stone and their utensils from reindeer's horn, in the midst of the unwholesome exhalations of animal remains, which in their carelessness they have heaped around them. The skins of captured beasts are stript of hair, and from these clothing is prepared by means of an awl of silex and a needle of bone. We see them armed with arrows and lances, whose points of flint have been sharpened for deadly execution, pursuing the beasts of the waste. We visit them in their fastnesses, where a horse, a bear, a reindeer, forms the product of a successful chase, and the repulsive flesh of

rats their resources against contingent famine. They conduct a commerce with the populations of France, and bring thence molluscous shells and jet, with which they delight to adorn themselves, and silex, which is so indispensable for arms and implements. Here is a store of fluor-spar, whose colors beguile their fancy with a show of luxury, and there the wide plate of sandstone destined for paving around the hearth.

But there come days of disaster, and truly disaster is not spared them. A concussion, a sudden downfall drives them from their rocky dwelling. The objects of their veneration, their utensils, are alike shattered, and they are cast forth to seek for some other shelter. Or death invades them with its desolations, and what pious cares do they then consecrate to those whom they have lost! We see that they lay the body away in a cave; an urn, weapons, amulets, constitute the equipment for the vault. A broad plate of stone guards against the entrance of wild beasts. Then begins the funeral feasts in the immediate vicinity of the sepulchre; fire is kindled on the hearth, large animals are dismembered, and the roasted flesh is distributed among the guests. There are no doubt other strange ceremonies practised, as is now the custom with the rude tribes of America and Africa, but these we can only conjecture. Analogy would point to songs, dances, adjurations, but science can afford us here not the slightest information. Again and often will this vault open, and small children, as well as men of full stature, take, one after another, their place in the cavern amidst the same ceremonies.

But the end of this oldest of known epochs is at hand. Floods overwhelm the region. The dwellers, driven from their caves, seek refuge in vain on the hills. Death overtakes them; a dark grotto becomes the grave of those hapless fugitives who, as at Furfooz, were witnesses of this great catastrophe. Nothing is spared by the fearful element. The sepulchral cavern, the objects of a touching solicitude on the part of these poor people, are forced open by torrents of water, and the bones of the dead are generally scattered abroad. Only the dwelling-place of Chaleux is exempt from the ruin; it is protected by an earlier catastrophe. This consisted in the downfall of the roof of the cavern.

Lucky and multifarious discoveries have conducted us to these results. The usages and industry of these tribes, which reach back to so distant an antiquity, can be pictured with some exactness. But much yet lies in darkness. We know nothing of their relations to the people of earlier times. Had they predecessors in the land? The important discoveries which Schmerling and Prof. Malaise have made at Engihoul seem to show than the men whose remains were found on the Lys were not the aboriginal inhabitants of Belgium, but only successors of an old population. At Chaleux also were found substantial indications of that primeval ancestry, but the traces were scarcely discerned when they were again lost.

Besides the three stations above named, a large number of caves have been discovered in France and Belgium, which everywhere

contained the bones of the same animals. Among these, the reindeer plays the principal part, and is always accompanied by the horse, the steinbock, the chamois, and the bison. The remains of the mammoth, rhinoceros, wolf, brown bear, lynx, glutton, sheep, marmot, and a common deer, are seldem found ; still more seldom those of the hyena, the tiger, the porcupine ; while the bones of birds and fresh-water fishes, which we need not enumerate, occur in abundance.

In the cavern of Bruniquel were found, by its owner, 1,500 different objects, which were all purchased by Professor Owen for the British Museum. Here were also discovered human remains, especially a jaw bone. The cavern of Chaleux, in the valley of the Lys and neighborhood of Dinant, presents a remarkable peculiarity, an analogue, so to say, of Pompeii and Herculaneum, cities which Vesuvius did not destroy, but has preserved for us. All the objects contained in the cavern, just as it was occupied at the time, have, as already mentioned, been kept entire by the downfall of its roof. The rubbish, under which the various articles lay buried, has prevented the destructive effects of the diluvial currents. After the removal of eight feet of compact detritus, the proper floor of the cavern, upon which man had resided, was reached. Probably the inhabitants were absent on the chase at the occurrence of the catastrophe, for no human bones have been found here, but some 3,000 implements of flint, as well as others of bone and reindeer's horn have been recovered. The hearth, paved with flat stones, lay in the middle of the cave, and on it were still found coals and ashes.

However incomplete may be the results thus far obtained, they still show in the most conclusive manner, the correctness of the deductions which have been drawn from them. The remains which have descended to us undoubtedly present many a riddle, but we should not despair of their ultimate solution. Perhaps a fortunate incident may bring us, sooner than we think, the desired explanation.

In conclusion, we should say something respecting the animals which, in that distant age, lived as the cotemporaries of man. The cave bear, *(Ursus spelæus,)* according to Owen and Pomel, first made its appearance in England and at Champeix in Auvergne, towards the end of the tertiary epoch. If all the determinations are correct, its remains have been found in Siberia, Scania, France, Belgium, England, and Germany. The cave bear was the largest of the species known, and seems to have become extinct before the reindeer era.

The mammoth *(Elephas primigenius,)* was living in middle Asia about the end of the tertiary epoch, but in Europe its remains are first found in the quaternary formations. It has inhabited a wide geographical zone, for it spread from Sicily to England, but to the south it extended not beyond central Italy and the Pyrenees. In Italy and southern France it seems to have survived during a part of the reindeer period, while further to the north it had disappeared.

The rhinoceros lived almost universally in company with the

mammoth, and became extinct during the reindeer age. It is generally known that a carcass of this rhinoceros was preserved, together with a mammoth, for many thousand years in the ice of Siberia. When discovered, they were found to be still furnished with both hide and hair.

The cave hyena *(Hyæna spelæa)* was, during the quaternary epoch, of very frequent occurrence in Europe. It is commonly supposed to have belonged to one of the two different African species still surviving. Thus far, traces of this animals have only been found in the pliocene or upper tertiary deposits, and it seems to have lived neither in Spain, the south of Italy, nor in Sicily. The cave hyena became extinct during the reindeer period, and in Belgium even before that era.

The gigantic cat of the caves,*(Felis spelæa,)* whether tiger or lion, a point very difficult to be decided from the parts of the skeleton found in those repositories, makes its appearance only with the quaternary period, and seems to have disappeared with the same. The reindeer period reveals some traces of it, and this indicates that the feline tenant of the caves had not then disappeared, like its cotemporary, the cave bear. Lartet even asks whether the former, like the aurochs, while withdrawing further to the east, did not survive within the period of history. In fact, the lion of Thessaly, spoken of by Herodotus, and which is figured on Grecian coins, endured a climate like our own, and could not therefore be the present African species. Dr. Falconer has gone even further; in his opinion the great feline animal which subsists on the slopes of the Altai and in the north of China, and which is generally supposed to be identical with the Bengal tiger, may well be the *Felis spelæa*, which, by reason of the increase of mankind and the development of civilization, has retreated into the deeper recesses of Asia.

The gigantic deer was chiefly an inhabitant of England and Ireland. A complete and very fine specimen of it may be seen in the British Museum. Its remains are met with, but not very frequently, in France as far as the Pyrenees, in Germany and the north of Italy. This animal existed as early as the pliocene era, and became extinct during the reindeer period. Its horns measured from 10 to 11 feet in breadth. It has been improperly called the deer of the peat moors, since, at the time when these moors were formed, it no longer existed,

The reindeer *(Cervus tarandus)* made its appearance with the mammoth in middle Europe, and hence at the beginning of the quaternary period. Its remains, which occur so abundantly in the caves and other sites where man has dwelt, testify to a vast numerical development at the epoch to which the animal has given its name. This circumstance enables us in some measure to account for the rare occurrance of the ure ox and the deer, for it is known that both these animals entertain a great antipathy for the reindeer. Where the latter has rested, the former avoid feeding. The reindeer, whose geographical habitat extended to the Pyrenees, with-

draws towards the north and disappears in middle Europe at the period of the last great movement of the waters and of the red diluvium. At the epoch of the peat moors it no longer existed in France. At present it inhabits the coldest regions of northern Europe. The remains of the elk *(Cervus alces)* are seldom met with in the temperate European latitudes. It seems to have followed the reindeer in its migration to the north, where it now exclusively sojourns.

The aurochs *(Bison europæus.)* This wild ruminant seems to have existed in the pliocene period, and was very widely distributed in middle Europe. Its remains occur sparingly in the peat moors and in the pile settlements of Switzerland. Cæsar did not observe it in Gaul or in the Hercynian forest, but Pliny asserts that the bison, which could be none other than the aurochs, lived in Germany. The animal is now nearly extinct, being found only in Lithuania, where it is protected by stringent laws, and at Gervais, in the forests of the Caucasus.

The great ox, or ure ox, *(Bos primigenius.)* appears with the quaternary era, and attains so wide a geographical diffusion that its remains are found in the whole of Europe. It survived, like the aurochs, the ages of stone and bronze, and subsisted even in the age of iron. Cæsar mentions it in his commentaries, and the *Veson cornipotens* of the Chronicle of St. Gall (10th century) is, according to Steenstrup, nothing else than the *Urus* of Cæsar. The species is at present wholly extinct.

The musk ox, *(Bos moschatus,)* a smaller ruminant, is intermediate between, the ox and the he-goat. It lived in France and England simultaneously with the cave-dwellers. Its remains are found in the flint formations of the diluvium. At present it lives only in the coldest regions of America.

The horse *(Equus adamiticus)* dates from the origin of the quaternary formations. It differs from the horse of the tertiary era, but seems identical with the now existing species, *(Equus caballus.)* In the age of the cave bears and the reindeer, the horse was very widely distributed through middle Europe, and furnished the populations of that time with their principal food. A smaller race is met with in the pile settlements of Switzerland and in the Pyrenees. It was at a later period that man availed himself of the horse for riding, especially in war. The Greeks seems first to have practised equitation about the seventh century B. C.

## ART. IV.—THE TWO THEORIES OF MAN'S ORIGIN.

DARWIN AND AGASSIZ.*

*"Magis magni clerici non sunt magis sapientes."*

So restless, so quickened, has become the human mind, in this wonderful age, that has marked more changes than has ever taken place in the same space of time since the world's history was placed on record, that new doctrines and theories are daily enunciated, with an ability that astonishes, if it does not convince.

One propagandist maintains his ground with an intellectual skill that, for a time, carries with it conviction. Another and opposing one, advocates his with a degree of plausibility and force that at once undermines your former faith, and suspends the mind, like Mahomet's coffin, between the heaven of faith and the earth of uncertainty, throwing it into such a state of skepticism that the veriest opacity of blind faith is more satisfactory.

We have now new schools of natural history as we have denominations among sectarian Christians; and however zealous each may be in propagating its peculiar doctrines, it is no longer scarcely possible for any one school to claim that truth is exclusively with it. On one side we have those of the school of Darwin, who proclaim the doctrine of transmutation, or, as his opponent, so we shall call him, Agassiz, describes it, "that animals are derived from one another, and that there is a premature cell from which all animals may be evolved." That all vertebrates are derived from one primitive vertebrate, that all articulates are descended from one primitive articulate, that all mollusses are derived from one primitive molluss, that all radiates are derived from one primitive radiate, and that these four primitive types are derived themselves from one primitive cell, under the influence of light and electricity acting upon matter. Or, in other words, that man, proud man, with his long line of illustrious ancestors, is, after all, sprung from nothing

*"The Origin of the Species," by means of Natural Selection, by Charles Darwin, M. A. Agassiz 's lecture before the Association for the Advancement of Science and Art, New York, February 26th, 1867.

more important than a tadpole, or something even still more insignificant—that what has been so piously inculcated in us, of our origin from that fallen pair, ejected from the Garden of Eden, is all a fable ; that Adam, if he existed at all, was a negro, and but a link in the wonderful chain.

There cannot be a source of much consolatory reflection in this for some of our first families, who pride themselves on their descent. Indeed, we do not know a family, rich or poor, high or low, for we have yet to see one that does not lay claim to some meed of that gentility which mankind put on with his nether garments, who will receive this announcement with any other feeling than that of just indignation.

We would like to see the reception Mr. Darwin would get from Sandy McAlpin, whose naked skin is a standing evidence of the antiquity of his race, and, consequently, of his gentility, should he say to the face of this descendant of a "hundred plundering," but nevertheless, illustrious "clans," "McAlpin, my dear fellow, you fancy yourself the descendant, as your name implies, of a 'son of the mountain,' but do not lay the flattering unction to your soul ; it is all a mistake ; you are simply the offspring of a tadpole."

What would be the fate of the philosopher, should he say to Ryan O'Ryan, whose geneology is lost in the mist that arose from the waters of the deluge, "Ryan, my friend, you fancy yourself sprung from 'the O'Ryan' who, in turn, claimed descent from Fin McCool. Get rid of such fancies as quick as possible, my friend, for your ancestors, trace them as far back as you may, were negroes, and if I go behind the human family, I will prove them to have been tadpoles."

Sharing as we do, as an humble member of the human family, in the just indignation such foul aspersions cast upon our species calls forth, we cannot but shudder at the fate that would await the philosopher, should he thus address either the one or the other of these hot-headed celts. Nor should we wonder at it. Show us the man, woman, or child who, if shown a diminutive, insignificant, wriggling tadpole, burrowing in the mud of a dirty pool, and there and then informed that that was the first and most venerable of his or her ancestors, that would not at once contemptuously repudiate so degrading a connection.

The gravely disposed may think we are jesting in a manner unbecoming grave subjects of philosophy. Perhaps we are. But whether we jest or not, no one can say, who estimates at their true value the predilections and prejudices that influence a majority, a great majority, of mankind, that any other result could follow a plain, unvarnished announcement of such a doctrine, undermining, religiously and socially, ages of the world's schooling. If we have laid ourselves open to so grave a charge, it should be borne in mind that fiction and frivolity inoculates the literature of the day, and possibly, we may have caught the infection. Perhaps, without the admixture of some such ingredient, the numbers who, it is to be hoped, will peruse these pages, would be somewhat diminished. And if by such means we seduce one one within the charmed circle of high and ennobling thought—if even one be tempted to drink of the "Pierian Spring," he will plead our excuse. However, perhaps it is better that a grave subject should be dealt with in a correspondingly serious manner. We will, therefore, confine ourselves strictly to the subject in hand.

And yet, as we glance back, retrospectively at the past, we cannot help smiling at the confidence with which some, at least, of those theories are put forth. And if we turn to the future, the smile becomes even broader; for, in all probability, a decade of years will not have run its course before another set of propagandists will loom into existence, equally learned, logical, and respectable, and upset the doctrines of to-day, and in doing so, will, themselves, very likely, conflict with one another, just as Darwin, and Agassiz, and others, are now doing. Even geologists, who have lately come to aid the doctrine of the greater antiquity of man, or rather, we should say, through whose instrumentality man's advent on the earth is put further back thousands of years than we Christians have been taught to believe, are already divided into conflicting schools.

On one side we have Sir Roderick Murchison, who heads what are called the "Convulsionists," or "Cataclymists," while on the other, there is Sir Charles Lyell, who leads the "Uniformitarians."

Nevertheless, it does not follow that useful information, important facts, may not be gleaned from their researches; indeed, it is mainly with this end in view we place "The Two Theories of Man's Origin"

before the reader. The conclusion, however, at which the theorists arrive, is quite another matter. On these we will take the liberty of passing a few remarks, by and by.

Agassiz enunciates the doctrine that it is not only one that was started in the beginning, but many; and that it was not to one time only that creation has been limited, but that creation has gone on through all ages, and that under the direct influence of creative acts, all the differences which exist in nature have been brought about—that man is not the lineal descendant of tadpoles, or monkeys, but that he is "the chosen production of Divine intellect, and that he is made in the likeness of the Divine image." This last sentence, which we quote, sounds more in accordance with man's religious predilections; but as he maintains that the different and distinct species of animals have had separate and independent origin—that the negro owes his origin to his kind, the Caucasian to his, the Mongolian to his, etc., in fact, that all mankind did not spring from Adam, its want of orthodoxy is, of course, at once apparent.

The action of light and electricity upon matter in originating living beings, from which, in a successive chain, man is descended, forms the basis of the German school. Mr. Darwin, whether to satisfy his own religious impulses, or from the fear of shaking those of others—it is to be hoped the former—places an intellectual power behind the light and electricity which gives the first creative impulse.

Here we have three of the most eminent schools of natural philosophy, all differing from each other on this all important subject—the origin of man.

Vigorous intellectual efforts are, we understand, being made by some of the Anglican clergy to reconcile the Bible with Darwin's school. Who shall say the effort will be unsuccessful? What, with a strong motive behind, will not man's ingenuity accomplish?

Now-a-days, when naturalists study the anatomy of animals, it appears to be with the sole view of arriving at a knowledge of the origin of man—a knowledge which heretofore it was supposed lay only with God. But we live and learn. Whether we learn *truth*, however, is the question.

When geologists investigate the fossils buried in the earth, it is to the same end. When men investigate the physical differences

which exist among themselves—Mongolian and Caucasian, Caucasian and Negro—it is with a similar end in view. Whether they will ever make the great discovery, is a question we leave others to speculate on—with the full conviction, however, that many, proudly conscious of the ripeness of the age in which we live, will come to the conclusion that they will.

But we forbear for the present further comment. As the reader proceeds, he will find Darwin and Agassiz speaking for themselves. Mr. Darwin commenced the investigation of his subject many years ago, when as a naturalist on board Her Britanic Majesty's ship Beagle, he visited South America, where "certain facts in the distribution of the inhabitants and its geological relations of the present with the past inhabitants," attracted his observation, and gave birth to his theory.

"These facts," says Mr. Darwin, "seemed to me to throw some light on the origin of species—that mystery of mysteries, as it has been called by one of our greatest philosophers."

Mr. Darwin holds that the various species into which the animal and vegetable kingdoms have been divided by naturalists, are not immutable ; that the theory of separate and independent creation is an error, and that those belonging to the same genera are lineal descendants of some extinct species ; that uniform descent from one animal to another is brought about by what he calls Natural Selection. This Natural Selection is a very different thing from that selection which is made of superior animals for the purpose of crossing them to improve or change the breed. This he calls Methodical Selection. Natural Selection, as the name implies, is the result of natural laws, and is startling for its—we were about to say originality—but substitute the word boldness.

This doctrine, however, for which he gets a large share of well deserved credit, is like many other modern discoveries, by no means a new one. Centuries ago the subject was known and discussed. Mr. Darwin again brings it forward, dressed in a new guise. This, nevertheless, should not detract from its intrinsic merit—modern theories on electricity are not the less truthful because it was known to the ancients.

The domestic pigeon, as more easily illustrating his theory, was selected by him, into whose history and habits, past and present, he

enters with that ardor only known to the naturalist. This very well known bird, it appears, has been domesticated as far back almost as the records of man runneth. Domestic pigeons were known in the fifth Egyptian dynasty, about three thousand years before Christ. Among the Romans, in the time of Pliny, immense prices were paid for them. "Nay, they are come to pass that they can reckon up their pedigree and race." Akber Khan, in India, in the year 1600, was the greatest pigeon fancier, however, of which we have any record, he having at one time as many as twenty thousand.

The diversity of breeds is too great to enumerate here; yet each one—tumblers, barbs, carriers, pouters, turbets, jacobins, trumpeters, laughers, fantails, and a host of others—is the subject of a special study. The difference of beak of the English carrier and the short-faced tumbler, and the corresponding difference entailed upon the skull, the very long beak of the barb, and the very short, broad one of the carrier, the amazing length of the legs, body, and wings of the pouter, with its inflated crop, the turbet's very short conical beak, with reversed line of feathers down the breast, the feathers so much reversed along the back of the neck of the jacobin, forming a hood, the peculiar coo of the trumpeter and laugher, the number of feathers of the fantail, as compared with the next of the pigeon family, are all clearly delineated, and are but the stepping stones to the corollary at which he aims. The difference in the skeletons are no less strongly marked than the external organization. The period at which perfect plumage is acquired varies. So does the down with which the nestlings are clothed when hatched. The eggs vary in size and shape. Their disposition and voices vary, as well as their manner of flight.

Mr. Darwin mentions that great as are the differences between the breed of pigeons, they have all descended from a single stock, that of the rock pigeon. In this manner he traces all animals, no matter how great their diversity, to a common source.

Commencing from a common origin, how are the innumerable varieties to be accounted for. Habit may account for some effect, as well as the condition of life, climate, location, etc., but are these agencies sufficient to explain the physical differences that exist among animals whose habits, manner of life, etc., may be said to be

similar, such as the lion and the tiger, the wolf and the fox, and so on, by whatever gradation the king of beasts may be traced to that diminutive speck of life to which, for convenience, we give the name of tadpole? Mr. Darwin says yes.

Although naturalists generally admit that the pigeon has a common origin, yet many ornothologists are inclined to regard the different breeds as distinct, well defined species, and possibly belonging to different genera. If they would, they have only to go to the different varieties of the same race of men to establish the same principle. One man may be tall, say six feet in height, proportionately large, straight, fair complexion, light hair, handsome features, powerful voice, well developed head, small hands and feet, in fact, a perfect specimen of a large, handsome man, while his grandson may not be over five feet in height, very dark complexion, weak, squeaking voice, coarse, black hair, broad, crooked nose, large mouth, thick lips, receding forehead and chin, disproportionately long, ungainly limbs, and large, peculiar feet. Here is a difference as great as any one variety of pigeons display from another. Would they say the two men were of different species? True, each would not, as the pigeon is said to do, transmit or reproduce its exact peculiar feature; but Mr. Darwin says they would, in time, and by the operation of Natural Selection. That is, by certain means resulting from condition, climate, manner of life, etc., which the reader will see more fully explained further on.

The theory is, the dark and ill favored are selected, their offspring if still more dark and ill favored again selected, and so on, until the negro is arrived at. Or, to keep more within the order of succession, by selecting the light complexion from the dark, we get a white race. This, of course, is the order by which such results could have been achieved. For if men, in this long line of succession, sprang from the lower animals, whose skins, as a rule, are dark, the Negro, consequently, must have been the first man that walked the earth—the progenitor of the white man, as the monkey is the progenitor of him. And all the "selections" resulting thus, Mr. Darwin says, is effected by natural laws—natural causes producing natural effects. "By the power of accumulative selection many breeds of animals are improved. So, too, on a similar principles, the horticulturalist improves plants and flowers,

though the variations in the plants and flowers are more abrupt."

"The steady increase of the common gooseberry has been the result of successive experiments. The continued selection of slight variations, either in the leaves, the flowers, or the fruit, will produce differences from each other, chiefly in their characters."

Habit, also, has a decided influence, as in the period of flowering, with plants, when transported from one climate to another. In animals it has a most marked effect; for instance, "in the domestic duck the bones of the wing weigh less, and the bones of the leg more, in proportion to the whole skeleton, than do the same bones in the wild duck; and the change may be safely attributed to the domestic duck flying much less, and walking more, than its wild parent.

"But the effect of what may be called unconscious selection is still more important. This arises from every one trying to possess the best individual animal without reference to the improvement of the stock. A man who intends to keep pointers naturally tries to procure the best dogs, and afterwards breeds from the best in his pack, but without any idea of permanently altering the breed; this process, continued during centuries, could not fail to produce remarkable permanent effects."

"There is reason to believe that the King Charles spaniel has been unconsciously modified to a great extent since the time of that monarch. Many authorities are of the opinion that the setter is directly derived from the spaniel, having been slowly altered from it. The English pointer has been greatly changed within the last century, chiefly by crossing with the fox hound; but in so gradual and unconscious a manner, that though the English pointer came from Spain, there is no native dog that resembles him in that country at present, at least so it is asserted."

In like manner, by a careful process of training and selection, the race horse has come to surpass in fleetness the original Arab stock. The cattle of England have also been greatly improved in size and weight and, possibly, quality, compared with the stock formerly kept.

If the accounts given in the old pigeon treatises of carriers and tumblers are compared with those breeds now existing in Britain, India, and Persia, the different stages through which they have

insensibly passed can be readily traced, and how they came to differ so greatly from the rock pigeon.

"The same gradual improvement through the occasional preservation of the herb plants may be recognized in the increased size and beauty now to be seen in the rose, heartease, pelargonium, dahlia, and other plants, when compared with the old varieties of the parent stock. The seed of the wild heartease will not produce a flower such as is grown in our gardens. Nor will the seed of the wild pear or apple produce such pears or apples as are now of almost common use. Even the pear, although cultivated in classical times, appears to have been of very inferior quality." The secret of this improvement consists in always cultivating the best known variety, sowing its seed, and when a slightly better variety chances to appear, selecting it, and so onward. "The gardeners of the classical period, no doubt, cultivated the best pear they could procure, though of an inferior quality, and in doing this, laid the foundation of that process by which we obtain the superior fruit of the present day."

"No one supposes that all the individuals of the same species are cast in the same mould. But the individual differences, such as are known frequently to appear in the offspring from the same parents, afford material for Natural Selection to accumulate in the same manner as man can artificially accumulate individual differences in his domestic productions."

It is a mistake to suppose that important organs never vary. The varieties, in fact, are so great, that in the flora of special countries drawn up by different botanists, a surprising number of forms have been ranked by one botanist as genuine species, and by another as mere varieties. The same is true of the different animals in different areas. Many of the birds and insects of North America and Europe which differ very slightly from each other, have been ranked by one eminent naturalist as doubtful species, and by another as varieties, or as they are often called, "geographical races." The term species, accordingly, is regarded by Mr. Darwin as one arbitrarily given for the sake of convenience to a set of individuals closely resembling each other, and not essentially different from the term variety, which is given to less distinct and more fluctuating forms. The term variety, again, in comparison with mere individual differences, is also applied arbitrarily and for the sake of convenience,

How have the exquisite adaptation of one part of the organization to another part, and the condition of life and of one distinct organic being to another being, been perfected? These beautiful adaptations are in every part of the world. They are seen in the relations of the woodpecker and mistletoe; in the humblest parasite which clings to the hairs of the quadruped or the feathers of a bird; in the plumed seed which is wafted by the gentle breeze. How is it again that minute varieties become, ultimately, converted into distinct species, which, in most cases, obviously differ from each other far more than do the varieties of the same species? All these results follow inevitably from the struggle for life. Owing to this struggle and variation, however slight, if it be in any degree profitable to an individual of any species, as in its infinitely complex relation to other organic beings and to external nature, it will tend to the preservation of that individual and will generally be inherited by its offspring. The offspring will also have a better chance of surviving; for of the many individuals of any species which are periodically born, but a small number can survive. The principle by which each slight variation, if useful, is preserved, is called "Natural Selection," in order to mark its relations to man's power of selection. Man, by selection, can produce great results, and adapt organic beings to his own use, through the accumulation of slight, but useful, variations, given to him by the hand of nature. But Natural Selection is a power incessantly ready for action, and is far superior to those of art. And thus man, the chosen image of the Creator, is himself, according to Mr. Darwin, not only subject to the influence of this Natural Selection, but to whatever power of artful selection, or as he calls it, Methodical Selection, that may be brought to bear upon him. And as this Natural Selection is in constant operation, in which the strongest and best is always preserved, it follows that from man, in time, will be produced something higher, and, in fact, something different to what he is at present. But to our subject: "The struggle for existence, which is the foundation of the principle of Natural Selection, includes not only the life of the individual, but success in leaving progeny. Two dogs, in time of dearth, may be said to struggle with each other which shall get food and live. Carry this farther, and you find a plant on the edge of a desert struggling for life against drouth; but a plant that

annually produces a thousand seeds, of which, on an average, only one comes to maturity, may more truly be said to struggle with the plants of the same and other kinds which grow beside it. A struggle for existence inevitably follows from the high rate at which all organic beings tend to increase. Every being which, during its natural lifetime, produces several seeds or eggs, must suffer destruction during some period of its life, which is generally short, otherwise, on the principle of geometrical increase, it numbers would soon become so inordinately great that no country could support the number. Therefore, as more individuals are produced than can possibly survive, there must in every case be a struggle for existence, either one individual with another of the same species, or with the individuals of distinct species, or with the physical condition of life."

"Every single organic being throughout the whole realm of nature, may be said to be striving to increase in numbers; that each lives by a struggle at some period of its life, and heavy destruction inevitably falls either on the young or the old during each generation, or at recurrent intervals. If this destruction is mitigated ever so little, the number of the species will almost instantaneously increase."

The answer as to how this struggle for existence bears upon the principle of Natural Selection, is this: "As variations useful to man have occurred, so we must expect that other variations, useful in some way to each being in the great, and complex battle for life, should also occur, in the course of thousands of generations. If such do occur, it can scarcely be doubted that individuals possessing any advantage, however slight, over others, would have the best chance of surviving and perpetuating their kind. On the other hand, it is evident that any other variations in the least degree injurious, would be rigidly destroyed. Thus, by Natural Selection, the preservation of favorable variations and the rejection of injurious, is kept up."

"Take the case of a country undergoing some physical change of climate. The proportional number of its inhabitants would almost instantly undergo a change, and some species might become extinct. Any change in the numerical proportion of some of the inhabitants, independently of the change of climate itself, would most seriously affect many of the others. If the country were open on its borders,

new forms would immigrate, and this, also, would seriously disturb the relations of some of the former inhabitants. Thus, every slight modification which might chance to arise in the course of ages, and which in any way favored the individuals of any of the species by better adapting them to their altered condition, would tend to be preserved, and Natural Selection would have free scope for the work of improvement."

The action of this principle is thus illustrated: "A wolf preys on various animals, securing some by craft, some by strength, and some by fleetness. Suppose the fleetest prey, a deer, for instance, had, from any change in the country, increased in numbers during that season of the year when the wolf is hardest pressed for food, can it be doubted that the swiftest and slimmest wolves would have the best chance of surviving, and so be preserved or selected, provided that they retain sufficient strength to master their prey, when they might be compelled to depend on some other animals. Even without any change in the proportional number of animals on which the wolf preyed, a cub might be born with an innate tendency to pursue certain kinds of prey. This cannot be deemed improbable, when such great differences are observed in the natural tendencies of domestic animals; one cat, for instance, taking to catch rats, another mice; one bringing home winged game, another hares and rabbits, and another hunting in marshy ground and almost nightly catching woodcocks or snipe. Now, if any slight innate change of habit or structure benefited an individual wolf, it would have the best chance of surviving and of leaving offspring. Some of its young would probably inherit the same habits or structure, and by the repetition of this process a new variety might be formed, which would either supplant or coexist with the parent form of wolf."

From four, or at most, from five progenitors, Mr. Darwin argues, animals have descended, and plants from an equally limited number. He further contends that analogy would lead still farther, and that all animals, and even plants, have descended from one common prototype. "In the chemical composition of all living things there is much in common, as well as in their germinal vesicles, their cellular structure and their laws of growth and reproduction. Plants and animals are often similarly affected by the same poisons. The poison secreted by the gall-fly produces monstrous growths on the wild

rose or oak tree." Mr. Darwin, therefore, infers from analogy that all organic beings which have ever lived on the earth have descended from some one primordial form into which life was first breathed. The period he takes for the perfecture of his theory is so great, that our world's history from the beginning is but a mere fragment of time, compared to the ages upon ages which must have elapsed since the "first speck of life," from which plants and animals alike have sprung, became animated.

Such, briefly, is the elucidation of Mr. Darwin's theory of the origin of man. Turn we now to the antagonistic doctrine of Professor Agassiz.

The ancients, according to Mr. Agassiz, made no comparison between monkeys and men, any more than between other animals. Aristotle, two thousand years ago, discusses the structure of man in connection with other animals, but in his work no comparison is found between men and monkeys any more than between men and other warm-blooded animals. The reason of this appears to be that there were only three classes of monkeys then known: the common monkey of northern Africa, the red monkey, and the baboon, of which representations are to be seen on the ancient Egyptian monuments. Neither of these monkeys, he thinks, has anything about them particularly human. The baboon has a head not unlike that of a bull-dog, and was called by the ancients *canocephalus*, or dog-head, on account of the peculiar features of the head.

When, however, the passage round the Cape of Good Hope to the East Indies was discovered, naturalists became acquainted with other varieties of monkeys from the west coast of Africa, and other places, which were of a different species from those known to the ancients. It was then the chimpanzee of Senegal and the coast of Guinea became known, as well as the ourang-outang of Borneo and Sumatra, and the resemblance in the higher form of the head which they bore to humanity induced naturalists to make the comparison which has been continued in all treatises on natural history.

Recently, a third kind of monkey, closely allied to the chimpanzee and ourang-outang, has been discovered in the lagoons of the more southern part of Africa, to which has been given the name of gorilla. This animal, it appears, was known to the Greeks; not however as a beast, for allusion is found in their literature to a kind of small,

hairy man observed on the west coast of Africa, which could not speak, and was savage and untameble.*

"Now, the question is," says Agassiz, "what are the structural relations which exist between those monkeys and other kinds of monkeys, and all monkeys together and mankind. In the first place, as a natural group, distinct among other mammalia, monkeys are characterized by anatomical feet, which is very striking. They have all four hands, while other animals have four feet, and man has two hands and two feet; and the difference which characterizes a hand and a foot is very obvious. A limb terminated with fingers, which are all on one level, and which all bend in the same direction, is a foot. A limb which has a number of fingers bending in the same direction, while one finger may be opposite to the others, and successively be brought into contact with each of the fingers, is a hand. The thumb, as a part of the hand, is flexible in another direction from the fingers, and the thumb may be brought into juxtaposition successively with each of the fingers, while this is utterly impossible with the toes of the foot. They all bend in the same direction, the largest as well as the others, and the large toe cannot be brought into position successively with the other toes. Now, then,

*Paul B. DuChaillu thus describes his first meeting with the gorilla: "While we were yet creeping along cautiously, the woods were suddenly filled and re-echoed with the tremendous barking noise or roar of the gorilla. Then the underbrush swayed about rapidly just ahead of us, and presently before us stood a gigantic gorilla. He had gone through the jungle on his all-fours, but when he saw our party he reared himself upon his hind legs and looked us boldly in the face. It was a sight I shall never forget. Nearly six feet high, with an immense body, huge chest, and great muscular arms, an intensely black physiognomy, with fiercely glaring, large grey eyes, and the most hellish expression of face, like a nightmare vision, stood before me the king of the African forest. He was not afraid of us, for he stood there and beat his breast with his fists until it sounded like a large kettle drum through the forest, which I found to be his mode of giving defiance to his foes, all the while uttering his loud, barking roar. The roar of the gorilla is the most singular and awful noise heard in these African woods. It begins like the sharp bark of an angry dog, then glides into a deep bass roll, which literally and closely resembles the roll of distant thunder along the sky; so deep is it that it seems to proceed less from the mouth than from the deep chest and vast paunch of the animal. His eyes began to flash fiercer and fiercer as we stood there before him on the defensive, and the crest of his short hair, which lay on his forehead, began to twitch rapidly up and down, while his powerful canine teeth were shown as he sent forth a thundering roar. He reminded me of nothing but some hellish dream creature, a being of that hideous order, half man, half beast! He advanced a few steps, then stopped to utter that horrid roar once more; advanced again, and beat his chest, and finally stopped when at a distance of about six yards from us, and here, just as he began another of his roars, beating his chest again in impotent fury, I shot and killed him. With a groan that had something terribly human in it, and yet was brutish, he fell forward on his face; the body shook convulsively for a few moments, the limbs moved about in a struggling manner, and then all was quiet."

all animals which have feet at the extremity of their four limbs are quadrupeds, and all animals which have four hands, and not feet, are monkeys. This is, perhaps, the most characteristic feature of monkeys. I must, however, say there are some slight modifications in this respect among the monkeys, in as far as there are some in which the thumb is so short that it cannot readily be brought into juxtaposition with the other fingers, as in the hand of man, and there are monkeys in which the thumb is merely rudimental, so that four fingers are only developed. Then, again, what constitutes the finger is the position of the nail on the termination. The last joint of the finger in a perfect hand, the last joint of every finger, has a flat nail, covering only the upper portion of the joint, and not extending forward or bending over the joint. Now, this is the case with all the nails on our hands, and is also the case with the nails of our feet, but not with those of the animal, though we find there an imperfect hand, perhaps, where the thumb, or one or two fingers may have a perfect nail and the others may have curved nails, bending over the termination of the fingers. This is the case often among some of the monkeys."

Great variety exists in the size of the monkeys, some of them being as small as squirrels, while others approach man in stature.

What naturalists term the facial angle in intellectual man, is known as the right angle, and is formed by a line passing from the upper jaw, which meets with another line passing along the base of the skull. The ancients understood this line so well that when they wanted to make in their statues the intellectual organs of man particularly prominent, they exaggerated this line so as to give an overhanging or protruding forehead. To their great representative of creative power, Jupiter, they gave great prominence to the forehead, going even beyond the right angle, which, according to Mr. Agassiz, is, in this particular, retrograding. Thus the characteristic features which represent man's higher mental capacities, and upon which phrenology is founded, were long known before Lavater or Gall. The phrenological development of the monkey in its near approach to this angle, shows that he stands closer to man than any other animal, and the young ourang-outang, particularly, approaches nearer the characteristics of children than the older monkey to the older man. It appears that at an early age, when the features are

not yet as strongly marked with that rigidity apparent in the adult animals that are closely related to one another, they resemble each other more closely. Hence the great resemblance between young monkeys of a higher type and young children, than between adults. The nose is another great feature in all animals of the higher type. But in man, as well as in monkey, there is a marked difference between the representatives of the different types of either—the aquiline nose of the white man, the shape of the nostrils, which are open from backwards to forwards, and not sideways, so that the nostrils open from the side out, as with the lower types. Again, numbers of them are destitute of tails; the higher types, such as the chimpanzee, the ourang-outang, gorilla, are destitute of tails. Then the monkey is found only in the tropics where the palm tree grows. In Australia there are none, yet they abound in the adjoining islands. From these facts, Agassiz argues:

"That all differences which exist among animals cannot be ascribed to climatic influences, or that, at all events, climate, simply and of itself, does not produce animals which are akin to each other; for though Australia, which exhibits all the climatic productions of the tropical and temperate zones, has neither monkeys nor carnivorous animals, nor ruminants; neither deer, nor elk, antelopes nor elephants, nor rhinoceros, nor hippopotamus, nor tapirs, nor any of the other large quadrupeds which inhabit everywhere else the tropical regions of the earth—no giraffes, no camels, no bears, no weasels, no foxes, no dogs, no wolves, no cats, tigers, or lions; but the whole of the continent is peopled by quadrupeds of a peculiar kind—the *marsupial*, the kangaroo family—all remarkable for the peculiarity of having, like our opossum, a paunch to carry its young, the only genus found on this continent. All these animals of the *marsupial* genus have under the abdomen a paunch where their young, born in an immature condition, are transferred, and where they remain till they reach a greater progress in development. That *marsupial* group is a peculiar group of quadrupeds only known to Australia, and in their various forms they ape all the other families as are common in other parts of the world."

"All I want to impress upon you," says the Professor, "in this connection, is the fact that in every part of the world there are peculiar tribes of animals, and that these tribes do exhibit such close

relations to the climatic condition that we cannot, with any kind of satisfactory evidence, ascribe these peculiarities to other than climatic influences under which they live."

The ourang-outang, the gorilla and chimpanzee, from similarity of structure in hands, teeth, etc., are considered one group. The name by which these higher monkeys are known is *Anthropophogi*, or man monkey. The baboon presents features more like the lower animals, having a very prominent and large snout like a dog, tail short, limbs stout and body large and strongly made. Among them one other variety, "differing in size and color, length of hair over head and neck, in the mane, and so-forth." Another species of monkeys are characterized by long tails, slender forms, prominent snout, peculiar teeth, etc. And in South America monkeys are found with what are called prehensile tails, but in which the tail is covered with hair. Then there are howling monkeys, the lower end of whose tails are entirely destitute of hair, and whose throats are so enlarged that they produce reverberating sounds.

"Now, then, says Agassiz, "what do we find among men? Similar conditions. For men have not the same complexion, nor do they exhibit all the same characteristic features. And let me urge this fact, for one cannot consider the relations of mankind to monkeys unless we are aware how widely men differ from one another. While they are men, and while they have all the characteristics of humanity, there are yet among them differences about as striking as the differences which distinguish some of those genera of monkeys from one another—as striking, unquestionably, as the difference which distinguishes some species of monkeys. And unless we recognize these differences among men, and recognize the identity of these differences with differences which exist among animals, we are not true to our subject. And whatever be the origin of these differences, they are there at the same time. If it is ever proved that all men have a common origin, then it will be at the same time proved that all monkeys have a common origin ; and it will be by the same evidence proved that men and monkeys cannot have a different origin. There is the appalling feature of the subject— that the characteristics which distinguish the different races of men are of the same nature as are the characteristics which distinguish the different kinds of monkeys. And it was for that reason that early I mentioned that

the different races of men must have independent origins, because I saw the time coming when the question of the origin of man would be mixed up with the question of the origin of animals. Now, I hold the idea of the community of origin of men and monkeys, and other quadrupeds is a fallacy, the foundation of which I shall try to explain presently.

"All men agree in having four limbs, one pair terminating in feet, the other in hands. All men are endowed with the ability of standing erect, and their constitution is such that an erect position is not an acquirement resulting from education, and is not the result of the 'successive chain,' but is one of the constituted peculiarities of the human frame. The whole of the back-bone is so organized that man can carry with ease his heavy, broad head only in a vertical position. He has not, as animals have, a ligament with which he may support the head in a horizontal position with ease, but the head must be balanced on top of the vertical column, in order that it may rest and move with facility in every direction. Then man has limbs on the sides of the chest, so organized that he can move them in every direction, and touch every part of his body; and that pair of limbs terminate with the most perfect pair of hands known in nature, and that hand is constituted as readily to carry out the mandates of the mind. It is brought into the service of the intellect and is no longer an organ of locomotion, as is the case in the monkey. All these peculiarities are characteristic of men; and between monkey and man there is no structural transition. There is no gradation from the highest monkey to the lowest race of man. All these attempts at bringing man closer to the monkey by the lower types of humanity overlook these fundamental conditions which exist among men, both in structure and attainments. In the first place, in color, the difference is obvious, but they are of comparatively slight importance. Next, in hair there is a marked difference. The flowing, straight hair of the white is very different from the stiff and wiry hair of the Indian, and when we begin to compare that hair with the hair of the Australian, or with that of the Malay, or with that of the Feejean Islander, or still more striking, with that of the Negro, we find differences which are most marked. The hair of the white race is cylindrical; the hair of the Negro is flat, it is woolly, it is curly; and these peculiarities are peculiarities not brought

about by climate, for the two races have been known to exist side by side on the earth, and the white man has not assumed the woolly hair of the Negro, nor the Negro the straight hair of the white race. Then there is a difference in the dentation, and a very marked one. All the white race have their teeth vertical, the jaw short, and the manner in which the teeth fit one upon another is perpendicular; so that when we close the mouth we bring the lower teeth against the upper teeth in such juxtaposition that the two stand vertically, one above the other. While there are other races, among them, all the inhabitants of Africa, and South Atlas, and the South Sea Islands, who have their front teeth inclined, so that the upper and lower teeth, when brought against each other, form an angle, and the mouth is more prominent; and all the races of men with protruding jaws have also thicker lips. They have, also, the flat nose, which I have already described, with broad partitions between the nostrils opening sideways. All these differences have been known among them since men have been observed by man. On the ancient monuments of Egypt there are figures of Negroes, there are figures of Egyptians, there are figures of Jews, and there are figures of white men, as characteristic in all these particulars as we see them now; so that for at least as long a time as these monuments have been in existence, these features of humanity have remained what they were then, and have retained their peculiarities."

"How were these peculiarities brought about?" he asks. "Are they innate? That is, are they primordial, or are they the result of change?"

If these conditions are the result of change, then he argues, that the differences that are observed among monkeys are the result also of change. And if change as great takes place, why should not changes a little greater occur? And why not, therefore, all the conditions which exist among living beings be the result of successive changes? In fact, whether we are descendants of monkeys or men; "*whether we are the result of a natural evolution*, or the expression of a specific act of the Creator?" He does not directly charge those of Darwin's school with denying the intervention of God in nature, but he charges them with denying the immediate and direct interposition in the production of these differences. Man, he contends, is related in the animal kingdom in a manner that makes

it impossible to separate the classes which relate to his existence from those which relate to the animal kingdom. In the order of succession, through all geological time, is found, from the beginning to the end, a definite relation to something higher. And as man was introduced in the last geological epoch, so man, as the highest in the succession of living races, is seen to be announced from the beginning. This conclusion he bases on the scientific results of the comparisons of all races; and that upon the plan on which the animals living on the earth are constructed, there is no possibility of a higher being than himself. This is regarded as one of the most important points of his subject. Let us, however, hear him in his own words:

"Suppose this to be the brain of the fish, (illustrating,) we have here, as in all brains, a front swelling from which arise the nerves which go the nostrils, a middle swelling from which arise the nerves which go to the eyes, and a third swelling from which arise the nerve which goes to the ear, and then other nerves that go to different parts, about which I need not trouble you. These three swellings are so constituted that the uppermost is the smallest, those that occupy the middle position and the hindmost the largest. In reptiles we find that these swellings have about the same dimensions; the front swelling begins to rise so as to stand on a level with the middle swelling, which itself is about as large as the hind swelling, which is raised in dimensions from the other. This is properly the hemesphere of the brain, (illustrating,) this is the occipital portion and this is the cerebellum. In birds we find that the front part is so far developed as already to cover, in a measure, the middle swelling, but leaves the hind swelling uncovered. And from the bird we arise to the quadruped, and find that the front swelling covers the middle swelling completely, though it does not cover the hind swelling at all. And when we come to man, we find that not only is the middle swelling, but the hind swelling also covered in such a manner, and the position so changed, that instead of extending on the same plane, or rising slightly, as is the case in the reptile, or slanting, as is the case with the bird or mammalia, in man the brain is brought to stand at right angles with the spinal marrow, which extends through the back-bone, along the vertebral column. Beyond this, you see, there is no progress possible.

"Here we have the anterior part of the brain, which extends over the middle posterior region of the middle and hind parts of the brain, in a perfectly harmonious manner, and the whole commands the entire system in a manner which to be exceeded would lead to a retrograde movement, and not an onward progress. Take the different forms of brain we have among men, you will find the forehead a little more or less developed. Pass from them to the monkeys, you will find that the cerebellum will be uncovered very slightly and then more and more. In fact, we have a complete series, which shows that between men and monkeys, and monkeys and quadrupeds and reptiles, and reptiles and fish, there is an uninterrupted gradation of more or less complicated structure; but with this remarkable peculiarity, that the distance from one to the other is unequal."

Then we have another cardinal point in his doctrine: "In the order of succession of animals," he says, "will be found something singular."

"Most of the animals which existed in all geological periods exist now in their original type, though a more perfect type at the present time exist beside them. In the oldest formations, nearly all radiates, mollusks and lower forms of life are found. The first insect belongs to the carboniferous period—they cannot be found before. Among the vertebrates, fishes are found from the beginning. The reptiles from the carboniferous period onward. Birds we have from the Jurassic period," "though that," says Agassiz," is somewhat questionable. "Mammalia also dates from that period."

"Thus is seen how many classes have existed from the beginning contemporaneous with one another. This is a matter of fact—information on record."

Can it be admitted that contemporaries are descendants of one another, and animals which have appeared together at the same time are derived from one another? "Certainly not," responds the Professor. And here we pass to the third cardinal point: Are the different classes, though they may have appeared together—though their position, or apparent position, warrants the conclusion—are they really contemporaries? This is a question the solution of which would settle the question between the two opposing theories one way or the other.

However, let us see what further Mr. Agassiz has to say on the subject: "Certainly not," says the Professor, "we have at least representatives of these different classes in the earlier strata; but this is not all. The polypes at the earliest period were among the lowest, while we have polypes of a much higher grade now living; and so with nearly all the lower types of beings. It seems as if these types had been improving, as if they had undergone changes, and as if these changes had led successively to something higher. So it seems, but it is not so; for while we have polypes now that are superior to those that lived in the earlier periods, we have by the side of them polypes as low as the first known—as low as those of the oldest time. What imparted to those simple forms the desire, and gave them the capacity to become something higher, and go on producing something higher, and at the same time to remain themselves as they were at first?

"While we have certain lowest forms in the earliest time, and have gradually higher and higher, we have the lowest form side by side with the highest at the same time, so that we should have, according to the transmutation doctrine, the polypes incapable of remaining themselves, and at the same time not changing. This is not logic. And I think that a doctrine that has facts against it so glaringly, is not a true interpretation of nature. I do not know a physical force—I do not know a natural fact—which is capable of producing such results. But I know that mind can do it; I know that an author, when he attempts to record the process of his own mind, can do it up to the highest degree of perfection of which he is capable, and he can do it in such a manner that what he records may be successively the evidence of his gradual progress, and in the end, may be the evidence of his highest culture, and at the same time he may recall, if it be only for memory's sake, the doings of his early days, and place them side by side with the productions of his maturer years. And it is just that which we read in nature. We have an early manifestation of creative power, we have a later and higher production, and we have by the side of this latter a manifest reproduction of what had been in the beginning."

The fact that insects began in the carboniferous period, he adduces as another striking indication of the work of mind in the progress. The whole of the earth's surface, during the earliest period

of its history, was covered with water. There was no room for terrestial animals. When land appeared above the surface of the water, and vegetation began to flourish, then the first indication of land animals presented themselves in the shape of insects. "Is it," he asks, "because nature has undergone successive changes that animals and plants have made their appearance? And is it physical changes that called them into existence living beings, or have these physical changes taken place and been directed in such a manner as to prepare a home on which living beings can be distributed?" Has the physical world, in all its changes, been productive of the organic world? Has the inorganic produced the organic? Has the inanimate procuced the animate, or has there been an intellectual power superintending the whole in such a manner that the physical conditions should be brought about by which living beings should find an appropriate home for their growth?

These are the very important questions which he asks, satisfactory answers to which the Professor thinks he gives, one of which will be found in the order of succession in the vertebrates. Fishes only have existed as long as the surface of the earth was under the condition during which aquatic animals could exist. As soon as sufficient land rose above the sea, reptiles were called into being, and those large marsh reptiles found a home in the marshes and swamps of the earliest period. Next we find birds introduced, when the atmosphere was deprived of the gases and rendered purer, so as to enable them to exist. The accumulation of coal in the beds of the carboniferous period freed the air from those elements which accumulated in it, and enabled the higher warm-blooded animals to live. Again, he asks: "Has the freeing of the atmosphere of that carbon been the cause of the coming of the birds and mammalia, or has the process of nature been so directed by superior intellect, that at a certain time the atmosphere should be freed of those impure elements, so that higher forms of beings should be called into existence."

"In the beginning the same physical causes existed, the same chemical agencies operated as now. In the character of the rocks of the oldest and more recent formations, there is evidence of this. There is evidence of it in chemical identity of the materials of which the celestial bodies are made. 'The physical world, in fact,' remains the same."

Are the animals that existed at different times, differing as they have in the most varied manner, the result of causes that do not vary, which do not change in the same manner? "Diversified results," says the Professor, "cannot be ascribed to uniform causes." But one possible cause can be seen by him for this diversity—the intervention of mind.

And here we come to the fourth cardinal point, which brings us fairly round the compass of this important subject.

"There are," says Agassiz, "several hundred thousand different kinds of animals living on the globe of all types of the animal kingdom. Now, every one of them has its line of development, and each pass through a certain number of changes. Every sparrow begins with the egg, goes through the changes which are characteristic of sparrow life, until it is capable of reproducing itself in eggs, which will go through the same changes. Every butterfly arises from an egg, which produces a caterpilar, that caterpilar becomes a chrysalis, and that in turn becomes a butterfly—thus changes until it becomes a perfect animal, capable of producing another egg. So it is with every living being. There are those which are low and those which are high; in fact the animal kingdom as it is now, is constantly undergoing greater changes every year than the whole animal kingdom has passed through since the beginning until now, and yet no one has ever seen one of these animals swerve from the line appointed and change into something that is not like itself. That is the great fact. Every living thing reproduces itself under conditions which are the same now as they were in the beginning of the world, till now, and yet they do not change. Why? Because by nature they are not changeable, and do not pass from one into another, though they represent all the changes that animals can pass, through, is it logical to assume that those of an earlier period were other than what we see them now, in consequence of changes, and that the laws of nature have changed in such a manner that that which does not take place now should have taken place in earlier times? I say just as much as the cycle which every animal passes through in undergoing its development from the egg to its perfect condition, progresses according to its appointed law impressed upon it by the Creator."

An abstract of the two theories is now before the reader, which

will enable him to judge, to a certain extent, of the merits of each The struggle for existence among animals, man included, which is one of the features of Mr. Darwin's theory, is pretty evident even to one who would not rank as a close observer; but whether this struggle for life is the production of Natural Selection, is not quite so certain.

No one who has read that interesting and very suggestive work, "The Vicissitudes of Families," by Sir Bernard Burke, but must see in the rise and fall of families an evidence of the operation of this law even on the highest type of civilized man.

Some of the descendants of the most powerful Norman barons, to whose force of character and corporeal strength the conquest of Great Britain and Ireland is owing, whose families were both numerous and potential, the very embodiment of material durability, are to-day, according to this authority, cobbling shoes in a garret, or some other equally humble employment, alone, neglected and forgotten, on the lowest round of the social ladder, from which they either drop off, die out, or ascend again, or their progeny, owing, perhaps, to the energy engendered by their necessities, and in time the offspring of the cobbler in turn find themselves again strong and numerous, at the top, placed there by that vigor which luxury originally sapped in their ancestors.

Whatever results grow out of Natural Selection, it is doubtful whether, on the whole, benefit occurs from what Mr. Darwin calls "Methodical," or artificial selection—the crossing of breeds differing from each other. If fast horses and fat cattle are produced by this means, fecundity decreases and diseases increase. And artificial interference with the laws of nature, whatever benefit may be effected by it in one direction, will result in a proportional injury in another. Just as we see the artificial embankment of a river causes the tide or water to flow or encroach in some other direction.

Sterility is the bane of horticulturalists, who are constantly interfering with, crossing, the operations of nature. How many cultivated plants which display the utmost vigor, yet rarely ever seed?

A recent writer in *Blackwood's Magazine*, alluding to the subject of Natural Selection, says:

"As to the phase 'Natural Selection,' we are not surprised that it has called forth some objection. It seems to imply that the struggle

for existence really selects which kind of animal is to continue and which is to disappear ; whereas the struggle for existence only carries into execution a selection that was made when the stronger or the more favorably endowed animal was called into existence. Setting aside the claims of theology for a moment, and overlooking the inappropriateness of applying the term selection to the operations of nature, it is the progressive law of development that has really decided what kind of animal shall survive. For it surely cannot be the method of nature to give out, blindly, as it were, from time to time, all possible varieties, without any law of successive or progressive development, (a law in harmony with the rest of creation,) and leave it simply to the actual state of things to decide which of her new forms shall holds its ground. The expression 'Natural Selection' becomes still more irrelevant when we refer to this law of progressive development, to the creative intelligence which alone can really have *selected*. But the expression as used by Mr. Darwin does not necessarily imply any more than this, that the struggle for existence carries out a selection already made; the stronger or more igenious, or the better adapted animal *come prepared to win*.

"There is a race of red Indians living upon game. On the same soil is introduced a race of men more prospective in their thoughts, more observant and ingenious, who cultivate the earth. These cut down the forest and grow wheat. The red man disappears. Is it the struggle for existence that has selected which of these two shall possess the soil? The selection was made when the more intelligent race was introduced. Yet, in common parlance, and without any disparagement to this, the real selection, we may still speak of the struggle for existence between deciding which shall remain and which shall depart."

There are four points embraced in this philosophic dispute, the establishment or refutation of any one of which by either of the controversery, according to either's peculiar views, is sufficient to turn the other three against his antagonist. These are: First, whether in the gradations of structure which has taken place—and are still taking place—in animals, from the lowest to the highest, there is an unequal distance, or break, between the man and the monkey? Second, are the different classes of animals which have

appeared together at different periods contemporaries? Third, does man stand at the head of creative things, or can anything higher than man be evolved from him? Fourth, does every living thing reproduce itself, under conditions that do not alter, the same now as in the beginning of creation?

"Man," says Agassiz, "is related in the animal kingdom in a manner that makes it impossible to separate the classes which relate to the animal kingdom. In the order of succession, through all geological times, is found from the beginning to the end, a definite relation to something higher. And as man was introduced in the last geological epoch, so man, as the highest in the succession of living beings, is seen to be announced from the beginning."

Again, he says: "In fact, we have a complete series, which shows that between men and monkeys, monkeys and quadrupeds, quadrupeds and reptiles, reptiles and fishes, there is an *uninterrupted gradation* (the italics are our own) of more or less complicated structure." This quotation sounds as if Darwin, and not Agassiz, were pleading his case, but the continuance of the quotation shows it to be otherwise: "but with this remarkable difference, *that the distance from one to the other is unequal.*"

Now Mr. Darwin might very consistently ask him: How is it, if there is an uninterrupted gradation in the structure of animals from the lowest to the highest, that an unequal distance occurs? Where there is *uninterrupted gradation* there cannot be unequal distance; for gradation means "regular advance, step by step." "Regular progress *from one degree to another.*" If Mr. Agassiz calls him illogical, surely there is fair ground for Mr. Darwin to return the compliment. And as he introduces mathematics to prove what has been heretofore considered a self evident fact—that man stands at the head of created things—he might remind him that mathematics does not teach that where there is uninterrupted gradation there can be unequal distance; and he might add, that it was well characterized when it was called "a remarkable difference." What are we to infer when it is considered that this important point, this uninterrupted gradation in animal structure is, so to speak, the "right bower" of one and the "kedge anchor" of the other, without which the first—Darwin—would be totally wrecked and the second—Agassiz—set a drift.

Again, he might ask: "If, as you admit, there is an uninterupted gradation in the structure of animals, from the lowest to the highest, have I not, on the whole, a more tangible basis for my theory than you have for yours?"

Indeed, we might take the liberty ourselves of asking both, consecutively: How is it that out of the constantly operating Natural Selection from which Mr. Darwin contends that something higher and different is constantly evolving, there has not evolved from man something higher and different from what he is presented to us today?

Man is the same now he was five thousand years ago; the structure of the skulls found in strata of earth denoting periods of time far more remote, is the same as our own, and indicate just as high mental faculties as the skulls dug from a modern graveyard.

That something higher evolves from man we all know. But it is when he dies and goes to Heaven that this most advantageous evolution takes place.

"The doctrine of several domestic races," says Mr. Darmin, "from several aboriginal stocks, has been carried to an absurd extreme by some authors. They believe that every race which *breeds true*, let the distinction of character be ever so slight, has had its wild prototype. At this rate there must have existed at least a score of wild cattle, as many sheep, and several goats in Europe alone." And why not, we would ask? If the words we italicise, *breeds true*, have any meaning—that is, every animal truly reproducing its kind—a plurality of origin is the logical consequence. And yet, he says: "Even in the domestic dogs of the Old World, which I fully admit have probably descended from several wild species." Upon what principle does he give a plurality of origin to dogs, while he denies it to cattle or pigeons which differ from each other, as has been shown, just as much as dogs? How can he consistently talk of several species at all while contending that all animals alike descend from one origin.

The law of "Natural Selection," if it exist at all, operates upon one species as well as on another, and would produce the different existing varieties of dogs or cattle from one common origin as well as it would pigeons. If there is, as Mr. Agassiz asserts, a separate and distinct creation for many living things, and that from the com-

mon rock pigeon the many varieties of pigeons we now see have sprung—this most naturalists admit—why may not the different varieties of men be produced in a corresponding manner?

As man has an immortal soul, which the other animals have not, and which fact we don't think Mr. Agassiz will deny—at all events, he does not hesitate to attribute the *mysteries*, so we consider them, of creation to the power of the Almighty, whose intention he endeavors to unveil—we shall, therefore, take the liberty of asking one more simple question: If the Almighty created different races of men at different times and separate places, did He also give them different and distinct souls, each set of souls differing so as to suit the organism, high and low, of the separate races? To carry out consistently to the end his hypothesis, he must say yes.

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## ART. V.—MARITIME EDUCATION.

BY WM. M. BURWELL.

The new era which is upon the South renders it necessary to adapt the pursuits of our people to the exigency of the change. We have impressed upon our readers the necessity of utilizing all the interests and enterprise of the country, by mixing the industries and assigning to each individual the duty of sustaining Southern society by such service as she or he may be able to render. We have urged upon our colleges the duty of establishing polytechnic departments of science as applied to the practical arts. We are gratified to know that General Lee has constituted such a department in the Washington College of Virginia, thus adding to the influence of similar schools established by the University of Virginia, the Virginia Military Institute, and other colleges in the Carolinas and Georgia the weight of his venerated example.

We have copied the report of the Board of Visitors of the Naval Academy at Annapolis to call the attention of Southern legislators to the importance of organizing a maritime interest, and of providing for an appropriate education. Why the apothegm of Mr. Jefferson, that the ocean is a scene of strife, and that it becomes a powerful republic to abstain from its conflicts, should have been regarded as an oracle beyond appeal, we have never been able to imagine.

The enterprise of that portion of the Anglo-Saxon race planted south is equal to that of any other branch of the family. It has expended its engergies in exploring new territories, in making cotton, and making war, but it could open mines, build and work factories with the same success. Above all, it is eminently adapted to mining commerce, and navigation. Trace the naval history of America, and officers from the Southern States have a high position for gallantry and for seamanship in both wars with England. Turn to the commercial marine, and from the ports of New York and Baltimore have been commissioned Southern commanders of merchant sail and steam vessels equal to any. The late war developed an amount of invention, enterprise, and valor which has rendered famous the officers who planned and conducted the Confederate navy. Southern men are admirable fitted for adventure by sea or land. The necessity that every young man should work will impel them to seek on the sea an honorable, perilous, and profitable occupation, that will relieve them from the toils of agriculture. Are the Southern people unfitted for this signal pursuit of their ancestors and cousins? Southern races for a long time held command of the ocean. The Phenicians, the Carthagenians, the Romans, Italians, and Spaniards were in succession most successful mariners. The Chinese are believed to have first applied the magnet to navigation.

There is nothing, then, in the climate of the Southern States to prevent the men of the South from the successful pursuit of commerce by sea. Then there are good ports along the whole Southern coast, with lines conducting the interior trade to them. Then there are home freights, which would constitute a capital for a Southern shipping interest. With these elements of maritime capacity, why has the South had no seamen? We answer, because her statesmen have not so willed it—because her statesmen have deliberately and from preference turned over not merely the general commerce of the country, but the carrying trade of the South to other sections, and even to foreign nations. This is the true reason why we have had no commerce in the South, and why our magnificent harbors have been as useless as that of Acapulco. It may have been said that we had no fisheries to constitute a school of seamen—that we had no shipbuilders, and that we could not meet the competition of a maritime people. Allow us to profit somewhat by the new era which has

changed everything. Once the ocean was navigated by men trained from infancy to perform the manual and manœuvres of sail navigation. Where the forces of nature are capricious, the skill of man must be educated to employ or counteract them. Where the speed or safety of a vessel depended on the control of her cordage and canvas, or upon the conduct of her rudder, none could be employed except picked men, trained to know every rope and pulley in the storm-darkness—fearless of all that water or wind might do, skilled in the storms, calms, shore, shoals and currents of every clime and of every coast. Thus sail vessels, well officered and manned, were the product of time, skill, and practical education. This is the era of steam. Machinery now does for a people unskilled and inexperienced in manufactures what centuries of practice could formerly effect. The printing press, the cotton mill, the steam lathe, and other machinery for cutting iron, places the men of the present era abreast of the progress of centuries. Either of the machines mentioned will print, weave, or cut iron as accurately, and as effectually for the Southern young man who will take the lever as for the oldest hand-worker in Antwerp or Manchester. The steam vessel is in great part independent of winds and currents. If time and tide wait for no man, the steamer does not wait for time or tide. She contains within herself the power that directs her course, and she opposes to the powers of nature a force that can counteract them. It follows, then, that the same skill and length of training is not necessary in a steam sailor that was indispensable to him who navigated a sail vessel. One fourth of skilled seamen, and the remainder of active and resolute men, who need not have had more experience than an ordinary steamboat hand, will constitute an efficient crew for an ocean steamer. Observe, then, what a field of employment is offered our young men in the country who would like the maritime profession. The salary and wages of a seafaring man are better than those of an overseer or of a day laborer. Nothing is necessary to make a good sailor but the qualities necessary to make a good soldier, and our young men know pretty well what those are. Let our young men descend even from the mountains, and ship as hands on board an ocean steamer, and in a very few trips they will be competent to perform any duty required of a steam sailor other than those connected with the comparatively few sails and ropes

which there must be skilled seamen to manage. We refer our readers to this report of the national school at Annapolis for an explanation of a proper nautical education. It will be seen that there is nothing that Maury, or Semmes, or any of their compatriots cannot teach. There is nothing in practical steam navigation to be learned that younger seamen than these eminent officers cannot teach as well, perhaps, as their seniors.

We remind Southern legislators that as the French maritime inscription makes steam sailors in time of war of plowmen, so attractive wages paid in the Gulf and Atlantic ports of the South will allure many an enterprising young man, even from the mountains of Alabama and Virginia, to visit the tropical ports and enlarge his intelligence while he promotes his interest :

NAVAL ACADEMY—REPORT OF THE BOARD OF VISITORS, 1868.

In the department of mathematics the board strongly recommends the abandonment of the three highest branches of study, descriptive geometry, analytical geometry, and the calculus. We would not seem to undervalue these studies as affording mental training, or to imply that they are not of value to the officer whose tastes may lead him to the scientific investigation of some collateral branches of his profession. But we think that the better opinion of the day is that other studies, that of languages, for instance, are not much, if at all, inferior to mathematics as a means of mental culture. If an officer has special talents for mathematics, and desires to pursue the study of them, he will have obtained here a sufficient basis to enable him to do so during his future career. The time passed at the academy seems to us too short to permit of an extended course, particularly if, as now, so great a portion of the first year is to be devoted to the study of arithmetic.

We consider it, however, a matter worthy of attention whether the entrance examination should not be so thorough as to preclude the necessity of any further instruction in arithmetic here. Perhaps a very rigid construction of the rules already established on this point would effect the end proposed without any raising of the present standard of admission.

We are led, however, by this reference to the standard of admission, to observe that the study of English grammar also occupies a considerable portion of time which might be given to other studies, if the "satisfactory examination" in this branch which is required of candidates were understood to imply that nothing further should be needed to be taught here. As regards, also, the other English studies, we incline to think that the same remark which we have made as to grammar may be applied to the study of geography. There would thus be gained during the first year considerable time for the study of the elements of more purely professional branches, and also for commencing the French language. This we urgently recommend, as we consider it of importance to the proper acquisition of a foreign tongue that it should be begun as early in life as possible.

In the department of astronomy and navigation we believe the instruction to be very satisfactory, especially in its theoretical branches. We think, however, that more attention might be given to practical exercise in observation and in rating chronometers ; and also that practice in hydrographical surveying should be an obligatory part of the course of instruction. The advantages here for this work are very great, and time might be gained for it by abandoning, as we have suggested, some of the mathematical studies. For this branch of practice the midshipmen are admirably prepared by the instruction in drawing, which attracted our special attention from the excellence attained by nearly every member of the classes under instruction.

Chemistry we would recommend should be taught by familiar lectures, except so far as it may be required in the prosecution of steam enginery.

In this latter department we think the instruction adequate and very judiciously conducted. The graduating class is conversant with the general theory of the steam engine, and competent to perform, as was witnessed by the board, all the duties required in the engine-room of a ship under steam.

We were also much gratified at the high standard of professional ability attained by the class of acting third assistant engineers. We learn that they are considered by their very able instructor to be fully competent for the duties of second assistant engineers. Certainly the theses read by these gentlemen at their examination exhibited marked general ability, and, so far as we may judge, great professional research.

The board has been led to make a general examination of the scale of values attached to the different studies pursued at the academy, and considers it to be in the main very satisfactory. There is one suggestion which has heretofore been made by boards of visitors which has not been adopted, though we consider it of the highest importance. It is that aptitude in practical seamanship shall have a separate valuation, or, perhaps, we might rather say, general aptitude for the naval profession, if this could be satisfactorily ascertained. We think that it can. We have been struck with the admirable and impartial method by which relative values are assigned by the professors to the different recitations, examinations, and even to the competitive trials of skill in military exercises. We do not doubt that the academic board can devise some system of forming a judgment of the important quality to which we refer. And we are sure that every naval officer must be aware that the present method of assigning positions to the graduating class may fail, and fail perhaps very signally, to rank the graduates according to their ability to assume the active duties of their profession.

We do not think, however, that the difficulty we speak of can be fully met except by adopting a system of re-examination of each class after an experience at sea in active service. It appears to us that the graduates need to have it more fully impressed upon them that, varied as their studies may have been here, and successful as they may have been in their academic career, it is but the foundation of their professional knowledge that they have acquired. The school for the seaman, after all, must ever be the sea. By careful methods, by expensive appliances, by assiduous efforts of officers of established character, and, we may say, of world-wide fame, the government prefers the young men here to go forth and acquire their profession with greater facilities than their predecessors enjoyed, and we trust, with the same success. But we think there should be some further inquiry into the use which they have made of these great advantages. We therefore recommend that the plan of "final examination of midshipmen," laid down at page 37 of the regulations, be very rigidly adhered to, and that after that examination the class shall be rearranged in the order of merit. We would especially insist that this examination, "in order to insure uniformity and justice," shall take place at the Naval Academy, and be conducted with the aid of the academic board.

As bearing upon this same point, as well as upon the general character and reputation of the academy, we would recommend that the summer cruises of the practice ships be prolonged, and that the yearly leaves of absence given to all the midshipmen be discontinued. Some arrangement might be made by which each midshipman should have one leave of absence during his academic course. In this way might be avoided the large gatherings of these young men in our cities and upon our railroad routes, which cannot fail to be attended with some of the disorder and indiscretions into which all youths are apt to fall under like circumstances. At the end of the summer cruise we think it essential that all the ships should return here together, to undergo a very rigid inspection by the Superintendent, that the improvement made during their absence may be carefully ascertained, and that of the different crews compared and noted. This will afford a stimulus to the officers in charge as well as to the midshipmen.

And here we may submit also for consideration whether there may not be an advantage in making the tour of duty for officers at the academy four years instead of three. If not inconsistent with the general interests of the service, it is obvious that changes in the staff of the instructors are to be avoided. And by

making this term correspond with that of the midshipmen, one-fourth of the whole body of teachers would remain at the academy through the entire course of the class which came here at the same time with themselves.

The board has made careful inquiry into the sanitary condition of the academy, and finds it to be very satisfactory. In the large number of persons included in the establishment, there is now no serious case of illness under treatment by the medical officers, nor has any death occurred among the midshipmen since June, 1866. The whole history of the institution exhibits a like favorable condition, and shows, we think, that the location here is a suitable one in this respect. The present hospital accommodations, however, are entirely inadequate, being calculated for only twelve patients. This would prove a very serious deficiency in case of an epidemic, and we repeat the recommendation of former boards of visitors, that a larger building be erected. We also think that a change in the present medical staff is desirable. The duties of the senior surgeon embrace much correspondence, the revision of various returns and reports, and a general supervision of the hygiene of the whole establishment. These duties, with consultations in all important and doubtful cases, are sufficient to employ his whole time. To attend the daily calls for professional aid, there should be two additional surgeons, men of experience, that the midshipmen may have the benefit of the best medical advice at a period of life when it may be of the utmost importance to their whole future career.

We also advise that a competent dentist be appointed, and that the midshipmen be required to submit to a periodical inspection of the teeth.

The board was pleased to observe the evident good effect of the constant practice of physical exercise as shown by the muscular force and activity exhibited by the midshipmen. These exercises are a very important part of the education of all young men, and we think that the art of swimming may perhaps be deemed the most appropriate one for a naval officer. We recommend that instruction in this exercise be introduced and that it be made obligatory on the fourth class to perfect themselves in it. As the season for out-door swimming is spent in cruising, there should be constructed under cover a capacious tank, with proper means for keeping the water at a suitable temperature.

The board examined the storekeeper's, paymaster's and commissary's departments, and is pleased to report very favorably upon them. The present plan of having the storekeeper's department in charge of a paymaster has proven eminently successful. The articles supplied to the midshipmen are purchased with care, are of good quality, and are furnished at much lower rates than under the former system. The gain to each midshipman is about fifty dollars a year. The commissary's department is most admirably conducted; the provisions furnished are excellent in quality, well cooked, and of sufficient variety. The mess arrangement is a model of cleanliness and good order, and we think cannot be surpassed in any institution in the country.

The board has great pleasure in adverting to the high moral tone which prevails here among officers and midshipmen, and thinks that in this respect, and perhaps in reverence and regard for religion, the standard is higher than in most of the colleges of the country. The present chaplain has been assiduous, and we think successful, in the performance of his duties. There are Bible classes and a Sunday school connected with the academy, and we believe that few opportunities are lost of instilling into the minds of the pupils a sense of their responsibility to Almighty God as the Giver of every good and perfect gift.

The discipline of the academy we find to be in a very good condition, and nothing can be more satisfactory than the method of its administration. The bearing of the midshipmen towards their superiors is marked by a manly deference becoming their relative positions, whilst, so far as we can perceive, there exists a cordial good will between the pupils and their officers, creditable alike to both. The rules are strict, but not unnecessarily so, and we find that the great aim in this particular is to throw the young gentlemen upon their honor, to secure the observance of the regulations. This generous reliance upon their sense of duty, with an absence of all the low arts of espionage, has succeeded, we think, in a remarkable degree, and must continue to succeed even more fully, unless counteracted by adverse influences. We feel reluctantly constrained to say that we fear such influences are not entirely wanting. We refer especially

to the fact that midshipmen who have been dismissed from the academy for flagrant misconduct have been restored to their places here, contrary to the well-considered decision of the academic board. By act of Congress, "midshipmen deficient at any examination shall not be continued at the academy or in the service, unless upon recommendation of the academic board." No examination, it appears to us, can be more important than the one which is instituted into cases of disobedience and defiance of the rules of the academy. Certainly such offences may indicate an unfitness far greater than any shortcomings in the routine of study. We conceive, therefore, that the law may very well be understood to forbid the readmission of any student who may be found by the academic board deficient in the matter of conduct. Be this as it may, we deem it our duty to declare that in our opinion the readmission of dismissed midshipmen is a practice most injurious to the discipline of the academy, and that, if continued, it must render it fruitless of all good to the navy or to the country. The conviction that already the discipline here may have received an injury from this cause which will call for uncommon vigilance on the part of the officers, induces us to express our views on this point with earnestness and emphasis.

In this connection we also feel bound to say that another element of disturbance which adds greatly to the difficulty of preserving a high tone of morals and discipline is the admission of youths from the enlisted apprentices. We wish to be perfectly understood as fully sharing in the sentiment that the highest naval rank shall be accessible to the sons of American citizens of whatever condition in life. Nor do we wish to say one word to the disparagement of the apprentic system, as that is not within the scope of our examination here. But we greatly fear that experience shows that in the present day the general moral character of seamen is still such as to make the close association into which these boys are thrown with them a most severe ordeal. At all events it seems to us that when these great educational advantages are to be bestowed, we shall do better to select youths fresh from their homes and families, than first to place them for a time under the pressure of influences which every naval man knows to be extremely pernicious. Moreover, these boys, it seems to us, can in no possible sense be likened to those who have in actual military or naval service risen from the ranks. They have performed no service worthy of reward, and the records of the academy show that, with very few exceptions, they are very unsuccessful in their academic career. The system of appointments by members of Congress we consider to be a sufficient safeguard against the growth of anything like a spirit of exclusiveness in the navy, and we would therefore strongly recommend that there be no further admissions from the enlisted apprentices. It might also be observed that such appointments inure chiefly, perhaps wholly, to the benefit of the great seaboard cities, and thus disturb the just distribution of these favors to the different parts of the country according to the ratio of population.

We deem it also of the highest importance that there be a strict adherence to the decision of the medical board which is convened to pass upon the physical condition of candidates for admission. Both in this respect, and in the literary qualifications required, we cannot forget that an entrance into this academy is a privilege of the highest value; that thousands of the flower of our young men are longing anxiously to enjoy it, and that a wrong is done both to them and to the country if we omit any means which shall further our obtaining youth of at least the average qualifications for this most essential branch of the public service. And the more we look at the matter in this aspect of it the more we are disposed to think that the present requirements for admission are hardly respectable in a country of public schools, whose boast it is that education is as free as the air to those who will accept it. On the whole, we are disposed to recommend that the standard of admission be raised, and that candidates for appointment should be between the age of 14 and 17 years. The present rule, from 14 to 18 years, seems too large a latitude to allow a fair competition between members of the same class differing in age, it may be, four years the one from the other. And we are decidedly of opinion that a youth 18 years of age is entirely too old to commence a scholastic discipline of four years, thus attaining the age of at least 22 years before entering upon any duties of his profession.

Room might be obtained for the erection of a hotel of moderate dimensions

for the accommodation of boards of visitors and such strangers as are drawn here upon business connected with the academy. An establishment of this kind is very much needed here, and could be of no possible harm to the institution if kept under strict military supervision. This arrangement has long been established at West Point, and can nowhere be more essential than here, owing to the extremely limited accommodations for strangers which is to be found in the city of Annapolis. This leads us to observe that the frequent visits of foreign officers, of members of Congress, and of distinguished citizens who come to examine the details of the system pursued at the academy, unavoidable require of the senior officer an outlay of means quite beyond the ordinary ability of naval officers. We submit that it would be proper that such expenses should in some way be met by the government. An allowance for this purpose might be made annually, and the unexpended balance returned to the treasury.

In conclusion, we desire to repeat our warmest commendation of the whole management of the academy in all its details, and especially of the zeal and earnest devotion to duty of its officers and instructors. The country, we think, may well be proud of this institution, and be satisfied that it here possesses a school for training its naval officers such as no other maritime power has before attempted. The immense importance of this establishment to the future honor and glory of the country has impressed itself upon our minds the more deeply the more we have examined it. We are persuaded that no expenditure of money, and no amount of fostering care can be wasted if they shall produce, as we believe they will, the men upon whom we may safely rely to uphold in the future the flag which they are here taught to love and to honor.

We cannot close this report without adverting to that feature in the government of the academy which has, we may say, impressed us more than anything we have seen, and which we believe must strike every intelligent observer. We refer to the very remarkable ability displayed by the distinguished officer in charge of the institution in every department of his duties. There seems to be no ramification, however minute, of the different branches of the academy which is not filled with life and vigor by the magic of his superior tact and power. This is the same touch of naval genius with which recent history has made us so familiar, and we believe that after the exploits in arms which have rendered Admiral Porter's name illustrious, he could serve his country in no more important position than that in which he is doing so much to fit the next generation of officers to emulate the deeds of their predecessors.

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## ART. VI.—MECHANICAL AIDS TO LABOR.

Having expressed our objections to the importation of Asiatic labor, it becomes our duty to offer some substitute for it. We have heretofore stated that the introduction of European whites affords at once the best means of increasing our staple products, of strengthening our political influence, and of establishing the supremacy of the white race in the South. We may add that manufacturing will employ a class of our population at present a charge upon our staple production. It will also add very greatly to the value of raw cotton by converting it into fabrics of much greater value. But there is another mode of adding to the productive force employed in staple culture, upon which we rely to obviate the necessity for an Asiatic reinforcement. This will consist in the use of fertilizers and im-

proved implements of culture, of which we will only notice especially at the present

THE STEAM PLOW.

We copy as follows from the report of the Commissioner of Agriculture for 1867 :

The application of steam power to the propulsion of machinery for the purpose of travel and transportation has been proved a success far beyond the most sanguine expectations of its warmest advocates. Animal power cannot compete with it. It is as untiring as the sun in his course, and when its day's work is done it needs no rest, but is ready at a moment's warning to renew its task. That it is destined to supersede animal power, even in agriculture, there can be no doubt. As the earth becomes more densely inhabited, it is more and more apparent that the available surface must be made to yield its 30, 60, or 100 fold in order that the increasing millions shall be supplied with food, raiment and habitation.

There is little doubt that with the natural advantages of soil and climate, with a proper system of cultivation, the continent of North America would be capable of sustaining comfortably the entire present population of the globe. Even now, with all its imperfections in culture, it furnishes bread for millions in Europe.

No portion of the globe is better adapted to steam culture than the broad prairies of the West, and it is upon these plains that the great problem of steam culture must be solved.

For convenience I shall, in this article, divide the various modes of steam culture into classes, and assign to each a title, the relevancy of which will appear as I proceed.

The hauling plow, so called because the engine that operates the plow is placed upon one side of the field, and moves along a headland ; the plows, generally a gang with two sets, turn furrows in the same direction in moving back and forth over the field. Upon the opposite side of the field is placed a movable capstan or windlass, which is moved forward upon a headland, and the plows are drawn back and forth by means of wire ropes or chains. At each set of furrows the engine is moved forward upon the headland upon one side of the field, and the capstan upon the other, the width of a set of furrows, when the plows are drawn again across the field.

This method of cultivating, or working the land by steam power, was first patented in the United States by E. C. Bellinger, of South Carolina, November 19, 1833, but from some cause the invention never went into general use.

About the year 1854 John Fowler, of England, improved upon this general plan of Bellinger's and was so far successful that a number of machines were put in operation. In 1856 and 1857 Fowler took out patents in the United States for his improvements, but up to this date but two of them have been brought into use in this country. As a special encouragement, Congress at its last session passed a bill allowing the introduction of steam plows free of duty.

Another method of steam culture has been attempted, in which the engines are designed to travel over the field, drawing the plows behind them, usually in gangs, and many patents have been granted for alleged improvements in this mode of culture. Among the earlier of these adventurers may be named Henry Corning, 1850; David Russell, 1855; Judd Stevens, 1858; J. D. Howell, 1859; B. Crawford, and many others.

Their efforts at improvement have been directed chiefly to the construction of an engine that was capable of traversing the field, and drawing a gang of plows; but hitherto insurmountable difficulties have been experienced. It has not been found impracticable to construct an engine capable of running over a common road, but in a cultivated field, where the soil is soft and yielding, it has been found that nearly the entire power of the engine has been expended in its own propulsion, and hence its inability to overcome the resistance of the plows.

The cause of the failure of traction engines to perform their work in plowing can be explained upon the following hypothesis:

We will suppose that an engine of 10-horse power, fully equipped for the field, will weigh eight tons. If it has four driving wheels of one-foot tread each, there will be 48 inches of effective contact with the earth. Now, a single furrow, 12 inches wide and 10 inches deep, will present a resisting surface of 120 square inches; consequently the resistance, even with a single plow, would be greater than the applied traction power of the engine.

But a team of ten pairs of oxen would be able to turn a furrow of prairie turf of the width and depth named, say at the rate of an acre a day for a single plow. Ten pairs of oxen would be equal to a ten-horse power engine, and their united weight, when fitted for service, would equal that of the engine—say eight tons. The foot of an ox has an effective contact with the earth of about eight inches, and we may safely estimate that one-half of the number of feet while under draught will be constantly in contact with the earth; hence we have 40x8=320 inches; that is, the eight tons' weight of the team is distributed over a surface of 320 inches of contact, to balance against 120 inches of resistance in the furrow.

An acre of land contains 43,560 square feet. A team turning a single furrow 12 inches wide and 10 inches deep will, upon an average, travel one mile in an hour. A furrow one mile long and 12 inches wide contains 5,280 square feet of surface, and hence it follows that the distance travelled by a team in plowing one acre, with a width of furrow of 12 inches, will be a little over eight miles, which is about a fair day's work.

A steam engine of a stationary power equal to that of 10 pair of oxen must, to be equally effective for draught, have a corresponding amount of contact with the earth; that is, the weight of the engine must be distributed over 320 superficial inches of surface in order to be equal to a team of the same weight with the same amount of earth contact. But an increase of surface contact would give a corresponding increase of power within certain limits—say to

double the amount; that is, if an engine could be so constructed as to have 640 inches of traction surface for eight tons' it would be capable of doing twice the amount of draught labor that it would with half that amount of surface.

A word about the comparative cost of feed and fuel may not be out of place. A team must have periods for rest and recuperation equal to one-half of the ordinary hours of labor, aside from the legitimate repose of night. But it is not so with a steam engine. It is constant and untiring in its labors; it needs no repose, but is ever ready for its task. An ox team cannot work upon an average more than 8 hours in 24. A single ox will consume as food the value of one bushel of corn a day, which would equal 20 bushels for the 10 pair every 24 hours. A steam engine of good construction, and of 10-horse power, can be run during a day of 16 hours by the consumption of an equal amount of corn as fuel; at least I am assured of this fact by an engineer of large experience in building and running locomotives. An engine of the power named, with a traction, surface of 640 inches, according to the foregoing comparison, would be able to draw two plows, each cutting a furrow a foot wide and 10 inches deep, at the rate at least of one mile an hour, equal to the speed of an ox team, and by a relay of hands to work it could be run 16 hours in a day, plowing four acres instead of one, (by the team,) with no greater consumption of food-fuel than would be required by the team. And there is a further consideration in favor of the use of steam in the business of cultivation. A team needs constant care, and costs the most to feed it when it is of the least service. The short duration of animal life, and the risk of premature death, add not a little to the cost of animal power.

The method of steam culture proposed by Bellinger, and subsequenty improved upon by Fowler, of England, is probably the most feasible that has been attempted. But this plan, under the most favorable circumstances, is open to objections, and in many situations it cannot be brought into operation. If a traction engine could be constructed upon the plan hereinbefore indicated, it would supersede Bellinger's and Fowler's plan of dragging the plow across the field by long ropes.

In the earlier attempts at steam plowing the great difficulty in the way of success, as before stated, was traction; and various plans were devised by inventors, both in England and America, for the accomplishment of the desired object. The English early tried two broad-tired driving wheels, but with the necessary weight of the engine the wheels, sank too deeply into the moist and loose soil, and of course failed.

Mr. J. Boydell, of England, in 1846, constructed an engine that laid its own track as it traveled over the ground. This he accomplished by hinging together a number of stout, flat wooden rails, so that they would form a polygon outside, and in the same plane with the driving wheels. These hinged rails were so attached to the wheels that they revolved with them, each rail in turn being laid

down in front and taken up behind its proper driving wheel, thus forming a track, composed of an endless belt of short rails hinged end to end. By means of this ingenious expedient Mr. Boydell was able to get traction, but, unfortunately, at the sacrifice of a great amount of power. In 1854 Mr. Boydell made some improvements in his machine, but for some cause it has never been introduced into general use, but, like many others of its kind, has been laid aside.

About the year 1858 Mr. Thomas H. Burridge, of St. Louis, Missouri, a man of remarkable genius, invented and built a traction steam engine, intended chiefly for field culture. It consisted, of a large cylinder, about 10 feet in diameter and 10 feet in length, and made of heavy boiler iron. A shaft was supported in the centre by means of rods or spokes at each end, and at equal distances from each end was secured an interior cog gear.

Upon the shaft was suspended an iron platform, which preserved its pendent position by reason of its gravity. Two reciprocating steam engines were mounted upon the suspended platform, and by means of a pinion cog-gear, operated by cranks from the engines, which cranks were placed at an angle of 90 degrees from each other, the pinion gearing into the main wheel upon the inside of the cylinder, rotation and progressive movement was established.

A gang of plows was attached to a framework in the rear of the traction cylinder, to which it was connected by arms extending backward from the central shaft. The practical operation of this engine showed that it possessed sufficient traction power for the purpose intended, but its unwieldly character, and its want of adaption for the performance of the work of a stationary engine, fromed obstacles to its introduction into general use.

In 1851 Messrs. Calloway & Purkis, of England, with a view to improvement in steam culture, constructed a neat locomotive, with two main traction wheels of 18 inches' tread, with a truck forward for a steering apparatus.

The engine differs in no important particular from those previously constructed in England designed for common road traction. To the rear end of the locomotive frame, is connected transversely an iron frame, 18 feet long, supporting at each end an axle, on which are keyed three cast-iron chain wheels, around which is passed the endless chain that carries the plows, to which rotation is given by the power of the engine, so that a relatively quick motion is given to the endless chain and attached plows as compared with the progressive movement of the locomotive.

There are four plows attached to the chain, each capable of cutting a furrow nine inches wide, and, consequently, every entire revolution of the chain, with its plows attached, turns up four furrows, 18 feet long each, while the locomotive will have advanced progressively 36 inches. This operation being continually repeated, the locomotive will leave behind it plowed land 18 feet broad, and cut to any required depth, with a remarkable degree of accuracy. The lines of furrows thus cut will be slightly oblique to the line of forward

movement of the engine, but may be made at right angles, by a slight adjustment of the transverse frame.

One patent has been taken out in the United States, by E. G. Otis, for improvements in this steam plow, but for some cause unknown to the writer it has never been put in successful operation.

The plan invented by Bellinger, commonly called "*cable traction*," and subsequently improved upon by Fowler, consisting chiefly in his balancing gang plow frame, has undoubtly been received with more favor, and has gone more extensively into use than any other, especially in England.

We are informed that there are now about nine hundred of them in operation in that country, and that one manufacturing establishment turns out four every week. Part of these are sent to the continent, some to the East Indies, some to Egypt, and two have been imported into the United States, one of which is in use in Illinois, and the other in Louisiana, and, so far as known, are successful.

The recent act of Congress admitting steam plows to importation free of duty for one year, undoubtly had reference to the Fowler plow; though others have been constructed and used in England, among which was one put in operation by Williams & Smith, in which the engine was placed at the corner of the field and the plow caused to traverse *around* it by means of a cable and capstans placed at the other three corners, and moved inwards as the plowing progressed. It will be seen that this plan differed from Fowler's only in this, that it went around the field; at every set of furrows the engine and capstans moving inward until the work was completed, while that of Fowler's traversed back and forth between headlands, upon which the engine and capstans were moved forward.

Among the steam plows invented in this country, that of John W. Fawkes, of Lancaster, Pennsylvania, has probably attracted the greatest attention. The accounts that have been published of its power and performances seem, however, almost fabulous. Certain it is that the expectations and promises of its friends have not been realized, although ten years have elapsed since the date of his (Fawkes') patent.

The following description of the construction and operation of "Fawkes' American steam plow" was written by Professor Alfred L. Kennedy, President of the Polytechnic College of Philadelphia, at its trial in Philadelphia, July 20, 1859, and published in the Albany *Cultivator* for September of the same year:

"The body of the engine consists of one horizontal, quadrangular frame of iron, about 12 feet long by 8 wide, which rests upon the axles of a roller. This roller which is six feet in diameter, and six feet long, is the driving-wheel of the engine. In front of the roller, and bolted within the frame, is the boiler, which is upright, surmounted by a dome and pipe, and so constructed that steam may be got up in fifteen minutes. Thirty minutes, however, are usually required. Over and behind the driving-roller is a water tank, which is of the

entire width of the engine frame, contains 12 barrels, sufficient to supply the boiler for five hours, and is so situated that when it and the boiler are full they counterbalance each other upon the roller. Attached to the frame in front of the boiler, and tapering forwards and slightly upwards like the bow of a boat, is a sheet-iron receptacle for coal. Here is also a seat for the fireman, the whole bow resting on two guide wheels, of 15 inches' tread, and four feet in diameter. Bolted to the under side of the frame, as frequently seen in locomotives, and on each side of the upright boiler, are the cylinders, each nine inches' diameter and 15-inch stroke, the piston rods of which are so geared to the crank of the roller that it revolves once for every six strokes of the piston. Great regularity of motion, increase of motive power, and control over movement of the engine backwards and forwards are secured by this arrangement; while the guide wheels, which may be turned at pleasure by a steering wheel in charge of the engineer, almost at right angles under the bow of the machine, permit it to turn in a circle, the radius of which is equal to the length of the engine, 18 feet. By a small independent "donkey engine," which is placed between the tank and boiler, the latter may be filled from the former, or the tank itself be supplied through a hose from a well or brook.

"Into the beams projecting from the rear of the engine pulleys are let, over which chains pass, whereby a gang of eight 14-inch prairie plows is suspended; a wheel on the beam of each plow regulates as usual the depth of the furrow, and the whole gang may be raised or lowered by a lever within reach of the fireman, who, with the engineer, constitutes the entire force needed to work the engine and plows.

"The machine was tested on timothy sod which had not been plowed for seven years. At a given signal from the whistle the fireman lowered the plows to the ground, which having entered, they were drawn forward up an incline of about seven degrees. They were lifted promptly at the margin of the land appropriated to the trial, the machine turning easily; again they were lowered, and the plowing resumed in as short a time as could have been done with a single plow and a pair of horses.

"The mean rate of speed was four miles an hour, and the united furrows were nine feet four inches wide; a strip four miles long, nine feet four inches wide, equals 197,120 square feet, which divided by the number of feet in an acre, gives almost exactly 4 3-10 acres per hour."

In the Albany *Cultivator* for August, 1859, we find the following editoral statement relative to the trial of Fawkes' steam plow, at the time and place before alluded to:

"The trial of a new steam plow recently took place near Philadelphia. It is the invention of Mr. Fawkes, of Lancaster. It is attached to an engine 18 feet long, 7 feet wide, and weighing seven tons, with upright tubular boiler. The engine rests on an iron drum six feet in diameter, and six feet long, inside of which is an axle extending from end to end. The plows are eight in number,

and are adjusted so as to lift up when the machine is turning at the end of a furrow, being turned and backed with as much ease as a common carriage. The two fore wheels are iron drums, 3½ feet in diameter, and 15 inches face, to prevent the engine from sinking too deeply into the ground. The machine turned over eight furrows at a time, each a foot wide and of ample depth, going at a speed that showed it capable of plowing several acres per hour. The work was perfectly satisfactory to the committee and spectators."

Past experience has pretty clearly demonstrated that our traction engines have thus far failed to afford the requisite power to drive the common plow in an economical manner. Let us then further endeavor to show the cause of failure, and in so doing we shall have advanced one step towards correcting the evil.

Fawkes' locomotive was of the high-pressure kind, and carried two stream cylinders of nine inches diameter each, with fifteen inches stroke, consequently the maximum force was about eleven horse power. The weight of the locomotive was seven tons, about five of which rested upon the journals of a traction cylinder six feet in diameter, and six feet in length. The amount of effective earth contact was, therefore, 72 inches.

Eight yoke of oxen, weighing in the aggregate eight tons, (much below the standard weight,) are capable of plowing eight furrows of the width and depth named, at the rate of 88 feet per minute, or one mile per hour, and in doing this they have a traction contact with the earth of 256 inches. Now, without allowing any deduction for the consumption of power by the increase of speed from one to four miles per hour, it would require 1,024 inches of contact, or 32 pairs of oxen, to drive eight plows at the rate of four miles an hour.

The resistance offered by one plow, in sward ground like that upon which Fawkes' plow was tried, is about 400 pounds. It requires one horse power to raise 33,000 pounds one foot per minute; therefore to raise 400 pounds (the draught of a single plow) one foot in one minute will require one eighty-second (1-82) of a horse power. Now, 3,200 pounds is 8 times 400 pounds, (the draught of Fawkes' eight plows,) hence it will take eighty-seconds (8-82) to move 3,200 pounds one foot per minutes.

Fawkes' plows were said to move at the rate of four miles per hour, which is 352 times one foot per minute ; therefore it will require three hundred and fifty-two (352) times eight eighty-seconds (8-82) of a horse power, to drive his eight plows four miles per hour, which is 34½ horse power, about 23 more than the maximum of Fawkes' engine, and this without subtracting anything for propelling his engine of seven tons weight.

It therefore follows that Fawkes' engine, in order to come up to the standard of an ox team of equal tons weight, should have had an increase of traction contact of 184 inches over the 72 of the driving wheel, thus equalling 256 inches, (which is that of the team under draught,) about a hundred less than the estimated power of Fawkes' engine required to develop its full working capacity of 11

horses. Hence it follows that Fawkes' locomotive should have had a traction surface of 352 inches, instead of 72, and to this deficiency may be attributed his want of success.

There can be no reasonable doubt that steam power, with more perfect means for its application, can be made profitably available for the purpose of tillage, but the locomotive is yet to be constructed that is capable of yielding the results sought.

Before closing this article I shall offer some suggestions relative to such construction with a view to a more perfect application of steam power in this direction. Among the various appliances to overcome the difficulties from want of traction may be mentioned the revolving screw, operating not unlike the screw, propeller in steamships. But experience has shown that the friction of the blade upon the soil consumed too much of the power of the engine to make its use successful as a means of propulsion. A patent was granted to J. R. Gray, in 1857, for a machine of this character.

In 1863, A. W. Hall, of St. Louis, Missouri, took out a patent for a steam plow, so nearly allied to cable traction as to render it worthy of notice, in which the points of novelty were directed to means for overcoming the hitherto almost insurmountable difficulties experienced from want of traction. The locomotive consisted of a frame work, supported upon four wheels, of suitable strength to bear the weight of the boiler and other parts of the machine. As he did not depend upon the weight of his locomotive for traction, it was built as light as was consistent with the required power.

There are two sets of rollers placed horizontally in pairs, transversely to the frame of the machine, and rotated in opposite directions at a uniform speed, by means of two sets of cog gears, which are driven by two reciprocating engines, located upon opposite sides of the boiler. The rollers are grooved in the centre to receive a rope which passes between them, and is held from slipping by the strong bite of the rollers. The rope is anchored at each side of the field to be plowed, the anchors being moved forward on head lands as the plowing progresses.

The plow are attached to the frame of the locomotive, which moves back and forth over the field by means of the bite of the rollers upon the rope, as before described. It will be seen that the rope forms a flexible track for the engine, the weight of which is supported upon ordinary bearing wheels, the progressive movement being due to the action of the grooved rollers upon the rope. This plan differs in no important particular from Bellinger's and other cable traction plows, except that the latter use a windlass instead of biting rollers, and that in Hall's the engine moves across the field, while in the others it is stationary during the plowing of the furrow.

All of these efforts show a gradual advancement and foreshadow a final realization of the end sought to be attained.

The common plow has, from time to time, been so much improved that it may now be accepted as the most perfect implements for preparing the ground for a crop. No other can compete with it in

regard to the amount and quality of the work performed, taking into view the time and expenditure of the power. If, instead of futile attempts to invent and construct implements intended to supersede the plow, the inventor should direct his attention to an improvement of the means for its economical use by steam power, we might hope for results commensurate with the importance of the subject.

A steam locomotive for farm purposes should be so constructed as to be available for other purposes than simply plowing and cultivating the soil. Its failure in this regard would be fatal to its profitable employment.

With a view to obviate the difficulties hitherto presented in the use of steam as a motive power in cultivation, numerous efforts have been made to construct machines and implements that would perform the desired work in preparing the soil in a better and cheaper manner than the plow.

It is not my purpose to enter very largely into a description of this class of inventions. The saving of power by the means proposed is more imaginary than real, for it should be borne in mind that the soil must be moved to the extent required, whatever may be the instrumentalities brought into operation.

The spading machines first invented were made to imitate, as nearly as possible, the same kind of work as that performed by the common spade when operated by human hands.

A series of spades with long handles, mounted upon the rear end of a frame supported by traction wheels, were caused in regular succession to enter the earth and throw up the soil as the machine moved over the ground. In these, the power to operate the spades was derived from the traction wheels, by means of a series of cranks or cams, and the operation was the same, whether the machine was propelled by animal or steam power. In either case the power required is the same, and cannot, in the nature of things, be less than that consumed in moving the same amount of soil by means of the common plow. The idea that the spades, by working backward, assist in the forward movement of the machine, is simply hypothetical.

Another question of no small moment is, that by no system of machine spading can the herbage be turned so completely under as by the plow. Spading machines have not hitherto proved successful.

Another device, very nearly allied to the spading machine, consists of a rectangular frame supported upon traction wheels, with a revolving cylinder armed with spirally arranged shares mounted upon the rear end. This, on being put in motion by the progressive movement of the machine, digs up the soil and throws it back in a comminuted state. In some the cylinder is armed with spikes, and acts upon the soil like a revolving harrow.

In still another form the spading device consists of a large, heavy cylinder, revolving freely on journals, either within the frame of the locomotive, or attached behind it by hinged arms, the cylinder being armed with narrow-curved blades similar to a ditching spade,

and as the machine moves over the ground, the weight of the cylinder presses the blades deeply into the soil, which is broken up and thrown loosely into the rear as the machine progresses. In some machines the traction cylinder is armed with hinged blades that are thrust out and retracted by means of cams, with a view to imitate the use of the spade by hand.

The last species of these diggers which I shall particularly notice consists of a rectangular frame mounted upon traction wheels. To the rear end of the frame a series of vertical shafts are secured, to which is given a rapid rotary motion, by means of a train of cog gears.

To the lower end of these shafts are attached cutting blades, which, on being lowered into the soil, by their rapid motion, cut and disintegrate it to the depth required, by the progressive movement of the machine leaves behind it the mellowed earth.

Although in the United States a large number of patents have been issued for machines and implements for steam culture, the efforts in that direction have not been crowed with success. The want of suitable adaptation in the devices themselves, or the lack of power to drive them, is the probable cause of failure. A great majority of our farmers are men of moderate estates, and not possessed of means to enter largely into a series of expensive and uncertain experiments.

In England it is not so. There the leading agriculturists are possessed of large estates, and are, consequently, in a more favorable condition to bear the expense of costly experiments. There, too, in the more densely populated agricultural districts, the land is kept under a better state of cultivation than in this country, thereby rendering steam culture more available and profitable.

Here the virgin soil is soon exhausted by excessive cropping, and a new field of enterprise is sought. There the same fields must, from year to year, be made to yield the needed crop. Here the vast domain of unoccupied fertile ground invites emigration, and the necessity for a more perfect system of cultivation will not be fully felt until our wasteful and slovenly system shall have been exchanged for one that is based on more rational principles.

Individual enterprises in agriculture must be merged into associative effort, at least so far as relates to the introduction of expensive steam machinery, for the purposes herein referred to.

When mowing and reaping machines were first introduced, it was not deemed necessary that every farmer of moderate means should possess one. A number would join in the purchase of a machine, and put it in charge of a man skilled in the art of using and keeping it in repair, and in this way a number of farmers could be served at much less expense, and with equal or greater dispatch, than could have been done had every one owned a machine.

Thus it was with threshing machines—which were taken from farm to farm, and used and kept in repair by men skilled in the business ; and thus it will undoubtedly be in the introduction of steam power for the purposes of cultivation. An engine, to become a

profitable investment, must be so constructed as to be made useful in other departments of farm labor than merely plowing and cultivating the crop. It must be made capable of adaptation for driving a threshing machine, sawing wood, grinding provender, churning, washing, pumping water, indeed, almost all kinds of labor now performed either by hand or animal power.

If steam plowing is ever to be made practicable, if the steam engine is to become generally useful upon the farm, "it can only be so at a moderate expense. The errors in the attempts yet made in steam plowing have arisen, perhaps, from making the steam engine too heavy, and on too large a scale."

That the steam engine is destined to supply the place of animal power, at least in a great degree, in agriculture, there can be no doubt, and thus effect a great reduction in the expense of working the land, and become a powerful instrument in augmenting the productiveness of the soil.

The following paragraph taken from a valuable work on the use of steam on farms, "The Farm Engineer," by Robert Ritchie, C. E., Edinburgh, Scotland, is worthy of notice:

"Having now enumerated a variety of different purposes to which the steam engine may be applied on the farm, and stated the simplest and most economical way of applying the first power to subordinate machines, any one who has paid even but slight attention to this subject must be convinced of the great capability of such a power; nor need any alarm be felt against the use of steam (as is often the case in diminishing human labor) when thus applied to farm purposes; as we may see that instead of diminishing labor, the extended use must tend to increase the amount. No doubt it dispenses with manual labor for some purposes, but in most of these human strength is misapplied, and it may be, health injured; but it brings forward many new forms of mechanical operations whereby the people may be employed. I am well aware that many intelligent farmers entertain a prejudice against the use of subordinate machines, from their supposed complications of machinery.

"It must take time to dispel such opinions; but the best way to do so is by those who use such machines and modes of application, showing by their good management the utility, success, and safety which attend them. Then will the use of different machines be gradually extended, and what at first may have alarmed the farmer become a source of interest or amusement to him; and what at first seemed a difficulty in management will soon become a matter of daily routine. There is, indeed, no class of men who know better the true value of economy than farmers, and they justly consider well and deliberately the nature of a declared improvement before they embark on it; but once convinced and satisfied of the advantages of any plan, there are none who are more gregarious in opinion and more ready to adopt it. It will never be the fear of a little extra trouble or danger, which may be almost considered imaginary, that will deter farmers from adopting steam in every variety of manner and circumstances on farms, if they are satisfied of its re-

munerative advantages. Perhaps in no branch of the art is there a better scope for invention, and, perhaps, less risk of mechanical science not being duly appreciated than in agriculture, if a knowledge of its advantages be at once realized."

It remains, then, to discover by what means such improvements may be made as will bring the great power of steam into general use in carrying forward the art that lies at the foundation of all our national prosperity.

The implements of husbandry have reached a point of commendable utility, and we only need a corresponding improvement in propelling power to render their work eminently successful. The wants of mankind at the present day demand a solution of this question. The point to be gained in this direction is the construction of a locomotive steam engine that will take the place of animal power in the leading business of farm work, but more especially in the department of plowing and cultivation.

That engines can and have been constructed possessing the requisite amount of power no one will for a moment question. The main object to be aimed at is to make them less unwieldy, and this can only be done by following out the indications of nature, both by the reduction of the weight of individual machines, and in the relative increase of traction surface.

We accepted a kind invitation from Mr. E. Lawrence to witness the performance of his steam plow on the Magnolia plantation, and placed ourselves in charge of Capt. Basset, of the coast steamer Myrtie. The digression will be pardoned when we say that a stauncher or better managed little vessel cannot be found, nor officers more accommodating to the planters and traveling public. The day, in the last of May, was delightful, and the Gulf breeze tempered any unpleasant degree of warmth. The view of the plantations which border the river was in every degree encouraging. The plant cane is resuming its predominance, the buildings are being painted and renewed, the fields are animate with hands and plows. The coast boat stops at every landing to discharge goods, groceries, furniture, and agricultural implements. There is every evidence of adaptation to the new era.

The reception of a guest at the home of a planter is always hospitable, and in the delightful household of Magnolia we enjoyed a relief from the toils of the city. The proprietor is a gentleman of unusual intelligence, combined with an uncommon degree of practical energy. He had lost immensely by the war and by the act of emancipation, and had thus the alternative of abandoning sugar culture on one of the best plantations in Louisiana, or adapting his

system to continued production. For this purpose he examined the problem of steam culture, and came to the conclusion that it would materially improve the necessities of the occasion. He therefore ordered from John Fowler & Co., of Leeds, England, the machinery of a steam gang plow, more powerful, we believe, than any ever constructed by them, and rating at eigeteen horse power. We copy from a communication of H. E. Lawrence, Esq., published in the report of the Commissioner for Agriculture for 1867, the following description of this machinery, and also of the cost of working it:

The entire machinery complete cost in England £1500. Each of the locomotive or traction engines weighs 10 tons, without coal or water. The engines are driven to the roads or head lands, where they stand on opposite sides of the field, and haul those great balance-wheeled cultivators or plows back and forth at a speed of over four miles an hour, or faster that a man can walk.

The engines, plows, and the entire steam plowing machinery are worked and managed with the greatest ease and facility, going over bridges and ditches, moving and turning as easily and speedily as a six-horse team.

The old "plantation hands" very soon learn how to run the machines, and, after a few weeks, are trusted with the entire management, being divided and placed as follows: one man to each engine, who keeps his machine in order, does his own firing, greasing, etc.; two go with the steam plow, one to steer and one to aid in case of stumps or obstructions, and one boy, with a cart and team of three mules, hauls the coals and water for both engines. Each engine consumes seven barrels for a day of ten hours. The coal costs in Louisiana, delivered on the land alongside of the levee, 65 cents per barrel.

The usual task in England of a set of first-class steam plowing machinery is eight acres per day of ten hours. The sub-soiler or pulverizer will work over from twelve to fifteen acres per day, breaking, stirring, and tearing it up from fifteen to eighteen inches deep. The cost of plowing in Louisiana, running fourteen inches deep, through the toughest and most sticky soil ever seen by man, is about as follows, allowing for a sinking fund and interest upon first cost, about twenty per cent. per year for both items:

| | |
|---|---|
| Labor of four men and one boy, per day | $ 5 00 |
| Fourteen barrels of coal, at 65 cents | 9 10 |
| Use of water, cart, and three-mule team | 2 50 |
| Oil, cotton waste, and gum packing | 1 40 |
| Current expenses per day | $18 00 |
| Add ten per cent. per year on first cost, say $11,000, greenbacks, for wear and tear per day | 5 00 |
| Ten per cent. for interest on cost | 5 00 |
| | $28 00 |

This allowance is much too large ; making the cost for each acre of land broken up and plowed fourteen inches deep $3 50, not a very high price for such plowing.

The Magnolia Plantation is an alluvial soil, cultivated with the common plow for three-quarters of a century. Beneath the draught of common cultivation are found logs of cypress, and stumps of live oak. The steam plow encountered many of these, dragging them to the surface, and thus preparing the ground for future cultivation, at far less cost than at present. We observed the operation of the plows with care. Upon the mathematical surface of a perfect plane, with an adequate depth of soil, and without the obstruction of hills, ravines, gullies, stone, or timber, there can be no doubt of its entire success. There are, it is true, but a small proportion of lands in any part of the United States which meet this requisition. But if steam does exactly the work of men and mules, and at exactly the same cost, it adds practically to the power of men and mules, and so increases the productive force in the country. For if a steam plow on the Magnolia estate can do the work of ten mules and twenty men, it liberates and leaves free for employment that number of men and mules on lands which cannot be cultivated by steam.

We have chosen to strengthen our own observations and brighten the description of the beautiful region of Plaquemines by adopting the report of Mr. Daniel Dennett, editor of the *Planters' Banner*, at Franklin, La. Of him we will say, as he is not present, that few men in the State have a clearer conception of her true interests, or have rendered more efficient service in promoting them. Like ourselves, he made a professional visit to the Magnolia estate to satisfy himself of the practical utility of steam culture, and we now assure him that a few joint stock companies could contract to plow that Paradise of a Têche from one end to the other. We know no lands we have ever seen which could more properly or profitably be brought under steam culture. But we give way to Mr. Dennett's description of a

TRIP TO PLAQUEMINES PARISH—RICE AND SUGAR PLANTATIONS.

In company with our friend and fellow-citizen, H. E. Lawrence, Esq., we stepped on board the little propeller Hunter, bound for the Empire Parish.

We passed sugar plantations, sugar refineries, live oaks with broad branches and heavy trunks, orange groves, the battle ground, where people fought, bled, and died for their country, and for glory,

long time ago; and on the broad surface of the Mississippi, all kinds of water craft, from the splendid steamships of Morgan to the oyster boat, were in sight passing between the Balize and New Orleans. The little giant towboats passed us frequently, with their sail ships of a thousand tons or more, laden with rich stores of merchandise for New Orleans, or Southern produce for New York or foreign ports.

### JESUITS' BEND.

By two o'clock we landed at Jesuits' Bend, about eighteen miles below the city. Here we halted for an hour, and then with a pair of spirited horses, and in a light buggy, we proceeded to Magnolia Plantation, forty-five miles below the city.

The plantation at Jesuits' Bend is delightful in many respects. There are venerable old trees standing there planted by the Jesuits before any of the present inhabitants of Louisiana were born. The front yard comprises several acres of ground, is tastefully ornamented with beautiful flowers and shrubs, and the dwelling and outhouses, though not expensive, have a neat and pleasant appearance, as though they were made for pleasure and domestic comfort, and but a hundred yards from the house the Mississippi rolls onward towards the Gulf.

### THE RIDE.

As we passed down the left bank of the river we were delighted with the orange groves which everywhere ornamented the lands of this favored region. But some of these groves in the last few years have suffered severely from the scale insect, or cocus, which has marred their general appearance. The orchards farther down look much finer.

We passed several rice plantations on our way down. The embankments here are generally not over five or six feet high, and the rice planters in the low water season make openings in the levee and fit gates in these openings, through which they irrigate their rice fields.

### MAGNOLIA PLANTATION.

At eight o'clock we arrived at the Magnolia Plantation, the property of Effingham Lawrence, Esq., a magnificent sugar estate, managed with much skill and great energy. Of the hospitality of the proprietor it is useless to speak. We have always found sugar planters' doors wide open to strangers, and no people excel them in politeness and kindness to their guests.

### THE STEAM PLOW.

Early the next morning after our arrival Mr. H. E. Lawrence took us to the field where the steam plow was at work.

To understand the character and operations of these plows, imagine two locomotives taken from a railroad, standing abreast of each other, three or four hundred yards distant, on the turn roads of a cane field, connected by a wire cable of the size of a man's thumb.

These locomotives weigh fourteen tons each. The main wheels are six feet in diameter, and have a tread of twenty-five inches. The tread of the two smaller wheels is twenty inches, and the diameter five feet. The length of the locomotive is twenty feet, its width nine feet three inches, and ten feet high. It has the power of about twenty horses. The plows are attached to the cable, and they plow four furrows both going and coming.

### ITS WORK.

At the time we saw it they were sub-soiling between rows of cane planted seven feet apart. They were running six coulters at once, three on each side of the cane row, the outer ones six feet apart, the next two four and a half, and the inside pair three feet. The foot of each coulter was about the size of a large man's hand, and the main shaft of the coulter was simply a solid bar of iron crooked to the right curve and angle.

The foot of each of these six coulters went from twenty to twenty-five inches beneath the surface and broke up the whole under stratum of clay to the width of more than six feet. We measured the depth with a tapeline which we had with us.

By the side of one of the locomotives there was a deep ditch, where the coulters terminated their work going one way, and commenced it going the other ; and towards this ditch the surface water makes its way after it settles from twenty to twenty-five inches below. No water whatever stands on the surface where these coulters have passed along.

The land where these coulters were sub-soiling is stiffer than that of the west bank of the Têche. We saw six mules to a plow in another field and no better work was done than two mules will do on the best of the Têche lands, or Cypremort, or Bayou Salé lands.

To pass plantation bridges these locomotives have two sticks of seasoned timber, about six inches thick and two feet wide, long enough to span the bridge, and leveled at each end, over which the locomotive passes.

### PLOWING.

In the fall and winter plowing the steam plow turns the soil to the depth of twelve or fourteen inches. It takes two hands to handle the plows and two engineers. One of the engines was run by a negro boy fourteen years old.

### HARROWING.

We saw a harrow by the roadside, not in use, intended for the locomotives above described. It harrows a width of sixteen feet. The teeth were two feet long and an inch and a half square.

### COST, ETC.

The cost of these plows, locomotives, etc., amounts to about $12,000. They cost £1500 in gold or English currency, at Leeds, England, and the tariff, freight, and other expenses are to be added,

Nearly all the duty has been remitted by Congress for one year to encourage the introduction of the steam plow into the United States.

Mr. Lawrence thinks that the use of this plow on his old lands will add more than half a hogshead of sugar per acre to the yield. He thinks that fall planting and deep sub-soiling at the same time will save the cane from rotting, and a good stand of plant cane may be secured beyond a doubt. He also thinks that stubble will be much better by relieving it from surface water.

He also thinks that crops planted and sub-soiled in this manner will not need half the working that other modes require, and that the land and crops will be greatly benefitted by relieving them of most of the treading and packing resulting from frequent plowing with horses and mules.

### THE REFINERY.

While at the Magnolia Plantation we went through the refinery which has been built up at a heavy expense on the place. They have lately been working over a lot of tar-colored West India molasses. From every gallon of molasses they get about two and a half pounds of dry sugar, of a superior quality.

We have not time to speak of the splendid machinery, engines, pumps, vacuum pans, filtering apparatus, tanks, coolers, pipes, centrifugals, etc., etc., connected with this refinery, and can only say that we were delighted, and picked up many new ideas on our trip through and around the establishment.

### ORANGE GROVES.

We were delighted with the orange groves of Magnolia Plantation. There are over five thousand bearing oranges trees within half a mile of the dwelling house. There were five or six trees near the dwelling house that were over forty years old, and they looked as vigorous as though they were just in the prime of life. We measured around them with a tape line and they ranged from forty to forty-nine inches in circumference, with fine, healthy, straight bodies, and boughs, branches, leaves and blossoms that could not marr the beauty, or adulterate the atmosphere of the Kingdom of Heaven. Amidst the millions of dark green glossy leaves, millions of beautiful, pure, fragrant white blossoms peeped out as if to bewilder the senses of all who can appreciate nature's charms when she exhausts her most ingenious arts in her efforts to please.

Wherever we cast our eyes while roving through those enchanted groves we saw nothing but nature in her most charming robes. Who would not live in these magnificant bowers, where the eyes are feasted from morning till night, and where all day and all night the air is loaded with the most exhilerating perfumes? And when these groves, through all their branches, are laden with golden fruit, mingling with their glossy, dark green leaves, who can do justice to such a picture through the poor medium of pen, ink, and paper?

### ORANGE BLOSSOMS.

Orange blossoms are an article of commerce in the parish of Plaquemines. They are sold in New Orleans fresh from the trees at twenty-five cents per pound. The blossoms from a single grove have been sold for five hundred dollars. They make a delicious syrup for preparing summer beverages.

### PLANTING AN ORANGE ORCHARD.

Orange orchards in this parish are usually planted in rows, twenty by twenty-four feet. About a hundred trees to the acre are considered a good stand. The land can hardly be made too rich for orange trees. The soil should be moist, but not wet. Orange trees do best in groves. Those standing separated from other trees, scattered over Magnolia Plantation, do not thrive well, and bear but little fruit.

### FRUIT AND BLOSSOMS.

We saw a sour orange tree full of fruit of last year's growth, and at the same time loaded with blossoms. Strange as it may appear, the ripe fruit begins to turn green, and in a month or two they will be as green as the new fruit in August. They lose their juice, the rind thickens, they are light and worthless, but in autumn, when the new fruit turns yellow, the old fruit again puts on its golden hues.

### LEMON TREES.

We saw some fine lemon trees on the Magnolia Plantation full of blossoms. They have a purple blossom, and are not as beautiful or as fragrant as that of the orange tree. These trees bear fine lemons every year, much finer than the imported fruit.

### FRUIT TRADERS.

Fruit traders from New Orleans go down to Plaquemines in the spring, after all the frosts are over, and purchase the orange crops, making an estimate so as to pay about ten dollars a thousand oranges, one half in advance, the rest when the crop is gathered in October, the fruit merchants gathering the crop at their own expense, and running all risks in regard to hail, storms, frosts, and all other casualties.

### RICE CULTURE.

On Friday morning Mr. Lawrence rode with us down to Riceland. We passed quite a number of rice fields, large and small, and the flood gates in the levee were more frequent than above Magnolia Plantation. Nearly every dwelling is surrounded by an orange grove. There are but few fine houses in this part of the parish, the people having an eye especially to utility and greenbacks. They

are said to be generally quite independent, even those who live in very humble dwellings. The rice and orange business pays well.*

### THE RICE FIELDS.

The squares are each leveed in lots of two or three acres, with gates to receive and others to discharge the water let in through the flood gates of the levees.

The ground is plowed with oxen, and harrowed with a harrow with blunt wooden teeth three inches long. When prepared for the seed it is like a bed of mortar. The seeds are soaked and sprouted, and sown broadcast, a bushel and a half to the acre. A single grain sometimes produces forty stalks, and the heads are frequently eight inches in length. The water is let in the fields when needed to kill the grass and to prevent the bad effects of too much dry weather.

### THE YIELD.

The usual yield on irrigated lands in Plaquemines parish is fifteen barrels of rice per acre—162 pounds of rice to the barrel. Twenty barrels is a large yield. They generally pay laborers $15 per month, but they generally dislike the business on account of the mud and water connected with it.

### RICE MILLS.

Our steamer halted at the Empire Parish Rice Mill to take on freight, and we went through the establishment. As these mills all clean rice with the same kind of machinery, and in the same manner, it is useless to repeat anything we said in our former articles on this subject. This mill is doing a fine business, and no mill in the State can produce finer samples than we found here. It is on the opposite side of the river from Magnolia Plantation, and not a mile distant from it.

Thompson's mill has six pounders, and can clean 23,000 pounds of rice daily. They charge a cent a pound for cleaning rice ready for market. They generally calculate at the mills that 162 pounds of rough rice should make 95 pounds of number one rice, and five pounds of number three. We saw splendid specimens cleaned at this mill, as nice, so far as we could discover, as the best Carolina rice.

In the State of Louisiana there are now twelve rice mills. Below the city, Farmers' Mills, Empire Parish, Court House, Franklin, and Riceland; above New Orleans, in St. Charles, Perseverance Mill; St. John the Baptist, Soniat Mill; St. James, Star Mill; in New Orleans, Louisiana Mill, and a mill at Algiers.

*Mr. Lawrence informs us that as his slaves remained with him until after the act of emancipation, he was one of the few planters who continued the sugar culture at the close of the war. These freedmen realized very good wages, which they took care of, and many of them have purchased small farms, on which they will cultivate sugar. This fact is commended to Mr. Greeley, and he is respectfully requested to report any case in which an African savage has been converted into a land buyer and sugar planter, except by the Anglo-Saxon life labor apprenticeship system, vulgarly called slaveholding.—[ED. REVIEW.

### WHITE MEN IN THE FIELD.

On the Magnolia Plantation there are ten white men at work in a gang, in the field, at $30 per month and rations. They give the best of satisfaction. They work and mess by themselves. They are made up of men of a variety of nationalities.

### COOLIES AND CHINESE LABORERS.

Chinese laborers have been employed in Plaquemines parish, and generally give good satisfaction. The laborers of this parish, like the mass of the population, represent a great variety of races.

### LOCAL AND NATURAL ADVANTAGES.

Plaquemines, or Empire Parish, has wonderful advantages which few can realize without visiting this section of Louisiana, traveling over it, making personal observations and inquiries, and taking a steamboat trip in front of the settlements.

1. They have a fine sea breeze and health. It is a poor country for physicians. Two or three do the whole practice for forty miles on both sides of the river.
2. Their soil is inexhaustible, and may produce abundant crops of sugar, oranges, lemons, rice, tobacco, Irish and sweet potatoes, melons, peaches, plums, grapes, strawberries, garden vegetables, etc.
3. They are not liable to overflows as they are higher up the river, the levees in many places not being more than five or six feet high, and have not been made higher for a hundred years.
4. They have fish and oysters in the greatest abundance, fresh from the river and the Gulf.
5. They have a noble river rolling in front, and a fine view of the noble steamships, sail vessels, and smaller craft that pass between New Orleans and the Gulf.
6. Their navigation is perfect, and all they could wish it to be. They can ship their products from their landings to New Orleans, or to any port on the globe.

When all the lands in the South and West shall be cultivated with improved implements, by the power of steam, and with the use of fertilizers, we shall have practically counteracted the effect of reduced labor, in the manner we have stated. It is said that the dynamic force of stationary steam engines in England is equal to the muscular force of 80,000,000 men. The improvement in culture has increased the average of corn produced in that country from 16 to 24 bushels per acre. The adoption of the same principles will add in like manner to the dynamic force and crop production of the United States. To build or import a steam plow of twenty horse power is to create the force of one hundred able-bodied men. The Vice Roy of Egypt imports "two hundred sets of the most approved

steam plow machinery with which to break up and plow more than 300,000 acres yearly of the land upon the Nile, and plant them in cotton, rice, and sugar cane." If the Southern States would follow this example, they might increase greatly our production. They might make the planter more independent of labor and the seasons, and escape the necessity of importing Chinamen and Coolies to infest our country, already embarrassed by the African social and suffrage questions.

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## ART VII.—DEPARTMENT OF COMMERCE.

### OUR MERCANTILE MARINE.

We regreat that the present session of Congress has lapsed without a debate on the important subject of the present unsatisfactory state of our mercantile marine, for, although a committee has been appointed to investigate the matter in all its bearings, this action necessarily delays legislative interposition, and we believe that the existing barriers to the recuperation of our shipping might have been lessened, if not removed, had the subject received that immediate attention which its importance so amply calls for.

A great deel of inflated language, many doubtful statistics, and sundry acrimonious diatribes, have been made use of, to befog the public on this vital matter, and it would really appear, in this case, that there is much truth in Senator Sprague's remark, that the politicians are averse to letting the truth be known among their constituents. It is to the press that we must look to counteract this want of statesmanship, and although in this article we may dispel many prejudiced views that are dear to our people, it is far better that we should do so at a time when an efficacious remedy can be found to the evil, than delay the treatment until a cure is impossible.

The cause of the decadence of our mercantile marine is due primarily to the losses incurred by rebel privateers during the civil war, but latterly still more so to our own misguided legislation. It is soothing to the self-pride as a nation, to indulge in the idea of having lost the supremacy of the seas though an open breach of international laws by a rival power, but it is suicidal on our part to yield to this sentimant without making an immediate attempt to retrieve our position as a maritime nation. It must be remembered that the shipping interest had become unduly inflated towards the year 1860; indeed, from 1855 the tonnage of vessels on the stocks began to show a falling off, and naturally, at the outbreak of the civil war, there were many causes that had a disastrous effect on our shipping, besides that enumerated under the perils of war. The immense freightage in cotton, furnished hitherto at the Southern ports, was entirely cut off, and the large number of vessels employed in our coasting trade with that section were obliged to seek occupation in other channels. Both these causes had a prejudicial effect on freight in every sea, and this evil was intensified later by the repeal of the reciprocity laws, and the heavy imposts on foreign wool, of which we imported about seventy millions of pounds, chiefly under the American flag. When we remember that this happened during that intense struggle between steamers and clippers for the carrying trade, which led to an undue expansion of tonnage througout the mercantile world, is it not astonishing that our marine was not almost annihilated? As it was, a great part passed under foreign flags, and on terms which proved advantageous to our citizens, as the exchange received in payment both yielded a large profit in greenbacks, and has found a more profitable employment in developing the resources of our country, than the shipping trade has ever presented since that time.

We could prove incontestibly, by our own statistics, that our mercantile marine was already on a decline at the outbreak of our civil war, owing chiefly to the lack of foresight we showed in not estimating, at its full value, the controlling influence the employment of steam was to exert on the ocean. But we prefer in this article to impress on the public mind that this decline has continued since the close of the civil war. Thus we find, by official notes, that the domestic tonnage in 1864 was 3,404,506, and in 1867 it amounted to 2,514,380, which, allowing for the difference of measurement, say 10 per cent., in the official valuation, shows a falling off of 1,141,564 tons. This represents solely our inland and coasting trade, which are zealously guarded from foreign competition, while on our registered, or foreign tonnage, for the same period there is no such decline. In 1861 we find the registered tonnage :

| | | |
|---|---|---|
| Sail | 2,540,020 | tons. |
| Steam | 102,608 | |
| Total | 2,642,628 | |
| 1867—Sail | 1,178,715 | |
| Steam | 175,520 | |
| Total | 1,354,235 | |
| Less 10 per cent. for difference in measurement | 135,423 | =1,218,812 |
| Decrease from 1861 to 1867 | | 1,423,816 |

Which proves that our domestic tonnage decreased 33 per cent. in three years of peace, and that our foreign tonnage only fell off 54 per cent. in double that space of time, notwithstanding the ravages committed by rebel privateers, and the sales effected to foreign merchants during the war.

In is time, therefore, that we should examine into this matter with all due care and attention, and we command to our readers an extract from an article which appeared in the *Galaxy*, emanating, we belive, from the pen of Admiral Porter, which advocates a radical change of policy if we would regain the preponderating position we once occupied on the ocean. We quote :

"We should commence now to prepare for the great commercial struggle that is to come, and our Government should at once hold out inducements to our merchants to start new lines. Congress ought even (for the present) to withdraw the restrictions with regard to buying foreign vessels, and let us purchase the fastest and best steamers that can be built on the Clyde, since, owning to the high duties imposed on articles used in shipbuilding, it is impossible for us to compete with foreign ship constructors in building either steamers or sailing vessels. The steamers now run by the French are English built, and of superior construction to the old style of vessels. Why, then, should we not adopt the same class of vessels, and drive both French and English from the track ?

"It may be a selfish consideration to wish to deprive our neighbors of a share of the profits of the carrying trade, when there are apparently enough for all ; but as this trade of right belongs to us, we should never allow such a reflection to be cast upon our enterprise as to permit any other nation to snatch this rich prize from our grasp.

"The power of a nation is measured by its commercial prosperity, as may be illustrated by that little iron-bound island, England, which dictates laws to the maritime world, and constantly holds the balance of trade against all other nations. As a military power, she is respected by all the world, and she holds, commercially, the same position that we could hold if we would take advantage of the opportunities that are and will be thrown in our way.

"Our shipbuilding interests are so much neglected that the sound of the ship carpenter's axe is seldom heard in any part of the Union. Over 250 vessels were destroyed by the Alabamas, Floridas and Sumters, fitted out by the rebels in the late war, and $80,000,000 worth of our property has been sunk in the ocean. It should be the aim of legislation to relieve those who have suffered so heavily from the commercial reverses of the rebellion—reverses due to the neglect of the government in not fitting out a fleet of cruisers able to chase the rebel privateers from the ocean.

"Heavy duties are now imposed on cordage, iron, copper, and other articles employed in the business. Timber is higher in price, and the cost of labor more by one-third than it was before the rebellion. To build a vessel of 300 tons costs $10,000 more than formerly. Our ship carpenters—a large class of mechanics—are almost all thrown out of employment, and hundreds of families are suffering from the pressure of want.

"When our commerce has been re-established we must protect it. A commercial nation requires an efficient navy, and although we have paid so little attention to this matter in the past, we must do better in the future. The navy of England has kept pace with its commercial marine; indeed, but for her great arm of national defence Britain would no longer have her great fleet of meachantmen. Her national ship are spead all over the ocean, affording protection to the smallest vessel that carries the British flag. The size and character of the English men-of-war are such that they command respect from all nations, and their commanders are supported in every act tending to the protection of British subjects or British interests."—*New York Mercantile Journal.*

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## SILK-GROWER'S ASSOCIATION NEFDED.

The laudable legislation for the encouragement of silk-culture in this State, like many other beneficent measures, has, it appears, been most shamefully abused, and the course of certain parties in this connection has furnishad an additional proof that depravity is inherent with many human beings. It is a familiar fact that our California Legislature, in order to offer liberal inducements for the creation of a silk growing and silk manufacturing interest in this State, enacted laws offering liberal premiums for the production of cocoons, as well as for the growth of mulberry trees. The legislation was generally indorsed as wise, and politic by the majority of citizens, and subsequent information seemed to confirm this view of the case to the extent that our people, our newspapers, and our public officers were felicitating themselves and conforming to the belief that, under the influence of these benigant laws, California was soon to take a positiion among the important silk-producing countries of the globe.

These anticipations and conclusions seemed fully justified, inasmuch as numerous enterprising citizens came forward, claimed and received the premiums offered by the State, even to a far greater extent than had been expected by the most enthusiastic advocates of agriculture, and certainly to a greater extent than had been contemplated by the enactors of the law. Founding his judgement on the premiums that that State was paying, Governor Haight very rationally concluded that we were soon to have plenty of cocoons, and that it would consequently be well and wise to prepare ourselves for properly taking care of them, and he therefore interested himself in having a competent person sent to Italy to get skilled reelers to act as instructors of our women in that branch of silk business, as it was well known that the number of our population who understood reeling bore but an insignificant proportion to the number which our premiums list suggested as necessary. Therefore Joseph Norton was sent to Italy after reelers, and Mr. Neuman was encouraged to persevere in the erection of looms for silk weaving.

Late investigations and developments, however, lead to the conclusion that the State and the public have been badly deceived, and that our silk interest is in a far less advanced state of prosperity than had been supposed. It is reported that visits to the orchards and cocooneries of some of the recipients of premiums have failed to disclose the vast number of cocoons that we had reason to look for. The number of cocoons fit for reeling-silk, bears a trifling percentage to the number on which premiums were claimed. Moreover, like the foolish man of the fable, we have nearly killed the goose of substantial and permanent silk culture, in order to get the golden egg comprised in the premiums, for it is found that the first leaves of the mulberry saplings, which it is disastrous to molest, have been plucked and fed to the worms in order to hastily produce cocoons and claim premiums. This course is destructive of the plants, and is calculated to produce those diseases in the worms which are devastating other silk regions, and from

which California has been happily exempt. The extent to which these deceptions and injurious practices have been indulged is not yet known, and it is to be hoped they have been discovered in time to avert serious backsets to the silk interests; but enough has transpired to suggest the importance and induce the formation of a Silk Grower's Association, whose duty it shall be to supervise this industry and interest, and see that it is established on a reliable and enduring basis.—*Stockton Independent.*

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[Reported for DeBow's New Orleans Review by R. C. Kerr.]

## TOBACCO.

The tobacco crop of the West for 1869 is estimated as follows:

| | HHDS. |
|---|---|
| Kentucky | 70,000 |
| Tennessee | 23,000 |
| Indiana and Illinois | 19,000 |
| Missouri | 8,000 |
| Total | 120,000 |

The foreign demand is estimated as follows:

| | HHDS. |
|---|---|
| England | 25,000 |
| North Germany | 15,000 |
| Spain | 10,000 |
| Italy | 10,000 |
| France | 9,000 |
| Belgium | 4,000 |
| Mediterranean ports | 3,900 |
| Other countries | 5,500 |
| Total | 82,400 |

The home demand is estimated at 35,000 hhds. for the West and 15,000 for the East, which brings the entire demand up to 132,400 hhds., being 12,400 hhds. above the estimated crop for the year.

In 1861, the countries included in the German Zollverein, with a population of 36,000,000, produced 38,940,000 pounds of tobacco, and imported 63,131,700 pounds unmanufactured tobacco. In 1867, they produced 72,932,000 pounds, and imported 107,470,000 pounds of unmanufactured tobacco—an increase of more than 72 per cent.

## COFFEE.

The following table shows the stock of coffee on hand in the principal ports of the United States on the 1st June, 1869:

| | BAGS. |
|---|---|
| New York | 157,000 |
| Philadelphia | 20,856 |
| Baltimore | 40,300 |
| Savannah and Mobile | 6,500 |
| New Orleans | 20,246 |
| Total | 244,902 |

The following table shows the imports and stocks of coffee in the principal ports for the two months ending February 28th, 1869:

| | IMPORTS. | | | STOCKS. | | |
|---|---|---|---|---|---|---|
| | 1867. | 1868. | 1869. | 1867. | 1868. | 1869. |
| | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. |
| Holland | 15,750 | 16,875 | 11,375 | 21,375 | 25,000 | 23,250 |
| Antwerp | 1,870 | 3,650 | 1,990 | 3,090 | 4,840 | 7,260 |
| Hamburg | 7,000 | 7,550 | 5,750 | 7,500 | 12,500 | 6,800 |
| Trieste | 3,125 | 1,070 | 1,430 | 3,259 | 3,571 | 3,392 |
| Genoa | 1,360 | 1,710 | 223 | 470 | 1,960 | 1,204 |
| Bremen | ..... | 450 | 885 | 433 | 200 | ..... |
| Leghorn | 300 | 350 | 280 | 150 | 160 | 140 |
| Great Britain | 11,120 | 7,675 | 6,175 | 11,522 | 15,979 | 16,325 |
| United States | 14,560 | 17,941 | 19,859 | 5,350 | 12,438 | 10,411 |
| Total tons | 55,085 | 57,271 | 47,967 | 53,149 | 76,648 | 68,782 |

Dr. Schlosser, a Holland statistician, estimates the annual consumption of coffee per head, in various countries, as follows:

| | | | |
|---|---|---|---|
| England | 1½ lbs. | Switzerland | 6 lbs, |
| France | 2½ .. | Belgium | 8½ .. |
| Germany | 4 .. | Holland | 10.12.. |
| Denmark | 5½ .. | United States | 7 .. |

Though the amount consumed per head in England and France is comparatively small, it must be borne in mind that Englishmen are essentially tea-drinkers, while chocolate is preferred in France. The actual statistics for 1867 are as follows:

| | CWT. |
|---|---|
| German Customs Union | 1,540,000 |
| Mecklenburg and the Free Cities of Germany | 80,000 |
| France | 944,000 |
| Holland and Belgium | 850,000 |
| Great Britain | 360,000 |
| Russia | 150,000 |
| Austria | 500,000 |
| Switzerland | 106,000 |
| Denmark | 120,000 |
| Sweden and Norway | 250,000 |
| Portugal, Spain, Italy, Turkey and Greece | 500,000 |
| United States | 1,840,000 |
| Canada, the Cape, Australia, etc | 180,000 |
| Total | 7,420,000 |

Thus, Germany and France together consume thirty-five per cent. of the whole amount, though the latter stands considerably below the former.

The consumption of coffee in the United States was, in 1867, 185,000,000 pounds, and Dr. Schlosser estimates the consumption for 1868 at 210,000,000 pounds.

## WHEAT PRODUCTIONS.

The area of wheat culture is diminishing in the older wheat producing States. The boundaries of the wheat districts are changing with great rapidity.

In 1848 the largest wheat growing States ranged thus:

| | BUSHELS. |
|---|---|
| Pennsylvania | 15,367,691 |
| Ohio | 14,487,351 |
| New York | 13,121,498 |
| Virginia | 11,213,616 |
| Illinois | 9,414,575 |
| Indiana | 6,214,458 |
| Michigan | 4,925,889 |
| Maryland | 4,494,680 |
| Wisconsin | 4,281,131 |

Not another State reached three millions of bushels.

In 1859, eleven years later, the principal wheat-growing States were these :

| | BUSHELS. |
|---|---|
| Illinois | 23,837,023 |
| Indiana | 16,848,267 |
| Wisconsin | 15,657,458 |
| Ohio | 15,119,047 |
| Virginia | 13,130,977 |
| Pennsylvania | 13,042,165 |
| New York | 8,681,105 |
| Iowa | 8,449,403 |
| Michigan | 8,336,368 |
| Kentucky | 7,394,809 |
| Maryland | 6,103,480 |
| California | 5,928,470 |
| Tennessee | 5,459,268 |
| North Carolina | 4,743,706 |
| Missouri | 4,227,586 |

No other States reached three millions of bushels.

It remains to be seen where the census of next year will place the center of the wheat region.

## TEA.

The following table shows the quantity of Tea shipped from China and Japan to the United States, (not including San Francisco,) from June 1, 1868, to April 19, 1869 :

| | |
|---|---|
| Black, pounds | 12,726,235 |
| Green, .. | 17,161,101 |
| Japan, .. | 10,230,853 |
| Total | 40,118,189 |

## NEW ORLEANS MARKETS.

COTTON—The Cotton market for the past month has been active, with an average advance of 2¼@2½c. ℔ lb on all grades. Small stocks, a good spinning demand, with considerable speculation and higher prices for goods, have caused the advance here, while at the same time the Liverpool market has shown more activity, at improved prices. The following table shows the rates here and in Liverpool, May 21st, June 25th, and same time last year :

| | May 21. | June 25. | Last Year. |
|---|---|---|---|
| Ordinary | 24 @25 | 26½@27⅛ | — @— |
| Good Ordinary | 26 @26¾ | 28¾@29⅛ | 26½@— |
| Low Middling | 27⅛@27¾ | 30 @30⅛ | 27⅛@28 |
| Middling | 28⅛@28¾ | 31 @31⅛ | 28⅛@29 |

LIVERPOOL QUOTATIONS.

| | | | |
|---|---|---|---|
| Middling Uplands | 11¾@— | 12⅛@— | 11⅛@11¾ |
| Middling Orleans | 11¾@— | 12½@— | 11½@11⅝ |

STATEMENT OF COTTON.

| | All U. S. Ports. | N. O. |
|---|---|---|
| Stock on hand 1st September, 1868—bales | 38,998 | 3,666 |
| Receipts to 25th June, 1869 | 1,992,182 | 833,949 |
| Receipts overland by manufacturers | 241,000—2,233,182 | |
| | 2,272,180 | 837,615 |
| Taken by manufacturers | 787,504 | |
| Exported | 1,406,864—2,194,404 | 821,351 |
| Stock on hand June 25th | 77,776 | 16,264 |

TOBACCO.—The market has been moderately active during the past month. The demand has been good and the receipts liberal. Prices for the lower qualities have slightly appreciated, and the market closes firm at the following rates:

| | Light. | Heavy. |
|---|---|---|
| Refused | 7½@ 8½c. | 8 @ 9 c. |
| Common Leaf | 8½@ 9½c. | 9½@10½c. |
| Medium | 9½@10½c. | 10½@11½c. |
| Good | 10 @11 c. | 11 @12 c. |
| Fine | 12 @14 c. | 12 @15 c. |
| Choice Selections | 14 @15 c. | 15 @16 c. |
| Fine Wrappers | — @— c. | 16 @25 c. |

NEW ORLEANS TOBACCO STATEMENT.

| | | |
|---|---|---|
| Stock on hand September 1, 1868—hhds. | 2,183 | |
| Received since | 19,841— | 22,024 |
| Taken for city consumption, etc. | 1,057 | |
| Exported | 13,414— | 14,471 |
| Stock on hand not cleared, June 25th | | 7,553 |

SUGAR—The market at present is dull and inactive. With light receipts from the interior, and a limited demand, sales are confined to retail and jobbing lots. The last sales were at 9⅞c. ℔ lb for good common, 11¼c. for good fair, and 14½c. for choice. The total crop of Louisiana, last year, was 84,256 hhds., of which 75,545 hhds., and 1967 bbls. have been received at this port. The receipts for the balance of the season are estimated at 2000 hhds., showing that only about 6000 hhds. have been consumed in the country parishes, or shipped direct from the plantations. Since September 1st, 1868, there have been 85,250 boxes, and 7396 hhds. of foreign sugar received at this port.

COFFEE—The market is without animation, and business is confined principally to job lots. Prices are firm at the following quotations, gold duty paid: Prime 16¼@16¾c., good 15¾@16¼c., fair 14½@15¼c., ordinary 13¾@14¼c. ℔ lb. The stock is now 17,700 bags in first and 23,000 in second hands.

SALT—Demand quiet. Dealers' prices delivered $2 20@$2 25 for coarse, 2 25 @2 30 for fine; factory filled fine $2 45@2 50. Turks Island nominally 45@50c. ℔ bushel. Louisiana Rock Salt is in fair supply and demand at $20@22 50 ℔ ton in sacks.

## NEW ORLEANS CATTLE MARKET.

| | |
|---|---|
| Texas Beeves, first quality, ℔ head | $ 35 to 40 |
| Texas Cattle, second quality, ℔ head | $ 25 to 30 |
| Texas Cattle third quality, ℔ head | $ 10 to 20 |
| Hogs, Western, ℔ lb, gross | 10to 11 |
| Sheep, first quality, ℔ head, | $ 4 to 5 |
| Sheep, second quality, ℔ head, | $ 3 to 3 50 |
| Sheep, third quality, ℔ head | $ — to — |
| Milch Cows, choice, ℔ head | $ 80 to 161 |
| Milch Cows, ℔ head | $ 50 to — |
| Texas Cows with calves | $ — to — |
| Yearlings ℔ head | $ 8 to 12 |
| Calves ℔ head | $ 8 to 12 |

# EDITORIAL.

Our Acknowledgements are due to the committee of invitation of the ball to be given at the Louisiana State Seminary on Monday, June 30th.

To Mrs. Stamps for invitation to distribution of medals and diplomas to the graduates of her institute, June 17, 1869.

Railroad Companies are respectfully reminded that their annual reports may be advantageously sent to the Review office, as one of its chief objects is to aid in promoting the internal commerce of the country.

Persons ordering goods of our advertisers will confer a favor by stating that they saw the advertisment in our Southern and Western Business Directory. In return we will attend to any commission of inquiry or purchase without charge.

All persons who were indebted to DeBow's Review before the war to an amount not exceeding ten dollars, will receive a receipt for the same on subscribing and paying in advance for the Review for one year, commencing with the date of such receipt.

As DeBow's New Orleans Review is the medium of advertising various collegiate and academical institutions throughout the South, the editor will take pleasure in giving applicants any information in regard to the terms, course of instruction, with letters of introduction to the principals who conduct these institutions.

To the People.—The malarious season is upon you, and you require some remedy other than quinine, which distresses your head with pain, and sometimes destroys your hearing. Therefore use the natural remedy of the country in which you live, Simmons' Liver Regulator; by its use you not only cure the ague, dyspepsis, headache, etc., but prevent its coming on. See advestisement.

Ætna Insurance Company of Hartford.—Among the numerous offices and agencies which protect the lives and property of our citizens there is none to which more confidence is due than to the Ætna Insurance Company of Hartford. Its assets consist of the most substantial securities, public and financial, and it shows an available capital of more than $4,750,000. The agents in this city are Messrs. W. B. Morris & Co., 57 Carondelet street, a firm well and favorably known for integrity and business capacity.

More valuable than Treasury Notes.—How that old cynic, Sam Johnson, would have revelled through Webster's massive now Unabridged! How he would have gloated over its magnificant letter-press and its illustrations, beautiful as new Treasury Notes, and *much more valuable* to the student. The Merriams have incurred a fabulous expense in having the whole work rewritten, reset, and republished. It is not a mere revision, but a reconstruction. To insure excellence in typography, it comes from the Riverside Press, which is all that need be said about its mechanical execution. It is a marvellous specimen of learning, labor, research, and taste, It is by far *the greatest literary work of the age.—Baltimore American.*

Book Notices.—We are indebted to the publishers, through the attention of Mr. A. Eyrich, bookseller and stationer, 130 Canal street, New Orleans, for the following volumes: From the press of D. Appleton & Co., 90, 92 and 94 Grand street, New York, "Appleton's Journal," Nos. 1 and 2; "Kirke White's Poetical Works," with a life of the author, by R. Southey; "Elements of Latin Grammar," for schools, by Albert Harkness, Ph. D., professor in Brown University; "Count Robert of Paris," and "Heart of Mid Lothian," by Sir Walter Scott; "Tommy Try! What he did in Science;" "Five Acres too Much," by Robert B. Roosevelt, from the press of Harper Brothers, Franklin Square, New York; "We Knew He Was Right," by Anthony Trollope, same publishers; "The Sacristan's Household," same publishers; "Unforgiveness," a novel, by Berriedale, New York, Geo. S. Wilcox, publisher; "Farming by Inches," by the author of "My Ten Rod Farm," etc., Loring, publisher, Boston.

D. D. McGinness & Co., 36 Camp street, have sent us a complete summary of "English and French History," in thirty-three pages, for the use of schools. It is received from the press of A. S. Barnes & Co., and is well printed. Of course, it can be but an abstract of an index; one half the volume is devoted to American history, and one-fifth of this to the late civil war. The book, as a manual for schools, does not teach all the events of the war as we understand them. The Army of the Potomac was "defeated at Big Bethel, successful at Romney, but routed in the most disastrous battle of Bull Run. The severe and sanguinary battle of Shiloh resulted in victory to the national troops. Gen. Banks had swept across the country to Red River, capturing steamboats and public stores." Gen. Grant "pushed Lee through the wilderness towards Richmond and besieged Petersburg." This summary is as unreasonable as it is absurd. It disposes of a campaign like a breakfast. Grant "pushed Lee through the wilderness," and lost 80,000 men in doing so. The historian vouchsafes these men no epitaph. The Federal historian makes the same apology for Federal failures that an American who undertook to underate to an Englishman the defeat of American arms at Bladensburg: "In fact," said he, "the American militia never could be induced to take any interest in that battle." We do not like these partial bulletins. They teach falsehood—they teach disaffection. It will be much more to the credit and strength of the nation to describe these events with regard to their importance. If justice be done to Southern motives and valor, the Southern people will be more sincere in their devotion to the Union. Let school masters teach the whole truth. It will teach mutual respect of the sections, and will consolidate the interests and prosperity of the Union.

We receive from the same house and press the first six books of "Virgil's Ænied," by Dr. Scaring, A. M. It is very well printed, illustrated with maps and other engravings, and explained with very copious notes. As a summary of the latest commentators it must prove a very valuable text book. We have referred it to our classical friend, Dr. R. M. Saunders, of this city, and are authorized to give his approval to the opinion we have expressed.

From Geo. Ellis, No. 7 Old Levee street, bookseller and stationer, the "Malay Archipelago," by Alfred Russel Wallace, from the press of Harper Brothers, publishers, Franklin Square, New York. We promise an extended notice of this interesting work.

The *Southern Farmer*, Memphis. We do not know any periodical in the South more thoroughly indoctrinated with the importance of utilizing all our resources than the *Farmer*.

Mr. C. C. Haley, bookseller, stationer, and news dealer, 19 Commercial Place and 153 Poydras street, for various valuable European magazines.

"La Revolution Espanola en Cuba per un Patriota," Nueva Orleans, from the press of *La Renaissance Louisianaise*.

Cleanliness next to Godliness.—This is a great and important axiom, and, it may be added, that he that provideth not for his household a washing machine is responsible for any unchristian temper in which his helpmate may indulge at the hard work of a week's washing, either by her own hands or those of the colored lady who may condescend to undertake it. We advertise two washing

machines, each of which has the highest recommendation. We are assured by respectable persons and practical experts that the Price Parlor Washing Machine washed recently, in this city, one hundred and eighty-three average pieces in an hour and a quarter, and that this work was well done, and without detriment to the goods. This appeals to housekeepers who wish to save time, money, and toil. We would recommend to such to examine the washing and wringing machine made by Raoul Sons & Wadley at their Southern Car Works, La., and for sale at their agencies, for which see advertisement. They are used and approved by many of our most prominent citizens.

Messrs. Thomas B. Bodley & Co. have established themselves as energetic and faithful representative of the interests confided to them by the manufacturers of agricultural machinery and implements. When we note the pressure of the labor question, and hear thoughtless persons insist upon the importation of coolies and other incongruous races, for the purpose of making cheap cotton for the consumer, we advise the planter to study the application of steam to the culture and the preparation of his crops—to seek every improved implement which will diminish the necessity for human or animal power. He can study these subjects to no more advantage than under the intelligent advice, and amongst the extensive assortment, of Messrs. B. Bodley & Co., No. 9 Perdido street, New Orleans.

A Majority of Persons living in the South are predisposed to deseases of the Liver, and most of the pains and aches complained of are owing to a deranged state of that important organ. The Simmons Liver Regulator is the great remedy for the diseases incident to a disorganized Liver, Dyspepsia, Constripation, Sick Headache, Female Irregularities, etc.

One says: It has done me more good than any medicine I ever used.

Another says: I consider it an invaluable remedy.

Another says: My son, who was so long considered a hopeless case, is now in blooming health, from using the Simmons Regulator.

For sale by all druggists.

Coleman's Flouring Mill.—This valuable Southern invention, besides being well built of excellent material, possesses some valuable principles of action, which have commended it to general adoption throughout the States of Alabama, Mississippi, Louisiana, Texas, etc., and have secured for it the highest premiums at six different State fairs. Its peculiarities consist in this, that the lower stone is the runner; it is so balanced as to spread equally any excess of feed over the whole grinding surface. The dress of the stone is particularly adapted to the work. Perhaps the best indorsement to our recommendation may be that we have purchased one of the mills ourselves from Mr. H. Dudley Coleman, son of the patentee, who continues the manufacture at the old stand, 205 Tchoupitoulas street, New Orleans. It may be as well to remind planters that Mr. Coleman repairs all kinds of mills, and can furnish all the mill stock that may be required. Read his advertisement in De Bow's Southern and Western Business Directory.

Mr. G. D. Bustamante is a Southern man of business, who has turned his characteristic energy upon the business of furnishing substitutes for human and animal labor in crop culture. He has had the sagacity to observe that when deprived of the labor to which we were accustomed, the Southern people began to seek out inventions by which they can substitute the steam engine and the sulky plow for the costly labor of a number one hand. He is now a missionary of this great truth, and is supplying to every planter, according to his wants, the precise implement that his plantation may require. We may add, that he also administers to poor and failing lands those stimulants of phosphate and guano which they require, and is, therefore, not merely a machinist, but a physician. We do not doubt but that, personally or by correspondence, he can prescribe for the ent agricultural inventions when we last saw him, and from his well known wants of any planter or mechanic, for he exhibited thirty valuable agricultural and labor saving inventions at our last State Fair, from among the many for which he is agent, and, judging from his well known energy, we doubt not he will be found exhibiting double that number at our next fair. Success to such reconstructionists of our industrial interests as Bustamante and Bodley.

Our country subscribers will find it alike safe, and convenient to remit by post-office orders. There are certain postoffices which are authorized to receive money on orders. They are not very numerous, but may be easily reached from any part of the Southern States. This process of remittance is very simple : the depositor applies to the Postm aster for a money order ; the Postmaster fills it up and forwards it to the New Orleans office. It is there paid to the order of the Review, and thus furnishes a receipt, and a witness of the transaction. If the order miscarry, it will be duplicated by the Postmaster, so that there can be no loss. Our subscribers will thus see a means of remitting us their dues, and we have no objection to their making a reasonable deduction if they wish from the amount due us. We should have to incur the expense of a special collector to reach them. This would cost us a good part of these subscriptions. It is, th refore, as well for us to pay a part of the commission, to the subscribers if they request it. The summer season is now coming on, when our receipts from the Southern country decline, because of the inconvenience of remitting. Yet we need money as much, or more, at that season, than at any other. Therefore, our subscribers will please send their dues throughout the summer. We have examined the names of offices authorized to remit in a few of the Southern States, and may add, that while Texas has but four, and Louisiana but nine such offices, Iowa has seventy-six.

Blymyer, Norton & Co., of Cincinnati, have, perhaps, given more attention to the expression and chemical treatment of cane juice than any other manufactory in the Union. This has been shown by the publication of the *Sorgho Journal* established by them for the purpose of developing that department of industry. The change in the labor relations of the South has tended to the subdivision of lands, and the organization of smaller sugar farms. On this point we may say that the consolidation of the capital and labor employed in a given production enables the planter to make and sell cheaper to the consumer. It is very probable that this subdivision may make it more profitable to the individual laborer, or planter. With this change however, the scientific and mechanical knowledge acquired by Messrs. Blymyer, Norton & Co. in the culture and manufacture of sorghum sugar and syrup has been valuable, and applicable to the small crop system of cane sugar as adopted in the South. They find that the same mill and syrup evaporator employed in the expression of sorgho cane and granulating of sorgho syrup, will answer also for similar purposes in the sugar culture and manufacture of Louisiana, Florida and Texas. As it is our duty to encourage the introduction of all improvements which will promote the interests of our planters, we commend this house and its machinery to their careful and candid examination. We may add that Blymyer, Norton & Co., of Cincinnati and Mansfield, have been in the cane machine business for more than ten years, and enjoy the reputation of being a solid concern, with a capital estimated at half a million dollars.

E. J. Hart & Co. as Druggists.—It is nothing extraordinary to deal largely in staple and fancy groceries, but the enterprise of furnishing a large stock of pure, and fresh drugs is one in which the Southern public should take a deep interest. The consumption of drugs and other chemical medicines throughout the Valley of the Mississippi is immense. The demand for these staples is spreading into the Rocky Mountains, and along the whole northern line between the United States and British America. Have our readers a correct estimate of the importance of this branch of commerce? In 1867 the gross revenue receipts from chemicals, dyes, drugs and medicines were $3,750,949 63. If we assume that these were entered at 33½ per cent. duty, it would amount to $9,125,948 89. But this is a small amount in comparison with the domestic manufacture within the United States. This would, no doubt, double the importations. We have, therefore, nearly thirty millions of dollars expended in medicine for the millions. If we assume one dollar a head annually as the sum represented by popular consumption, we should have about seventeen millions of dollars paid by the population of the Valley of the Mississippi and its tributaries. Now this is a sufficient basis to justify the establishment of chemical works and laboratories in New Orleans. It will especially justify the concentration and condensation of all those heavy drugs, dye woods, and minerals which pass our doors on their way from the South American ports to the Eastern chemi-

cal works. Why may not the jalap, sarsaparilla, and ipecacuana, with the gums and balsams, be as well manufactured and manipulated in New Orleans as elsewhere? Then there are the vegetable dyes, which enter so much into the manufacture of American fabrics—the logwood, madder, Brazil wood, arnatto, and an hundred others which are imported in a rude state to be converted into use. Messrs. E. J. Hart & Co. have taken the initiative by offering an extensive assortment, from the most celebrated laboratories of Europe. They have secured the services of Dr. F. A. Keffer, a graduate of the University of Pennsylvania, and a practical chemist and pharmaceutist, to conduct this branch of their extensive business, and we are authorized to state that this enterprising house has already taken steps to organize a laboratory in this city on a scale equal to that of any in the Northern cities. This is much better than importing drugs and specifics from the North to be sold at a New Orleans agency, without other gain or profit to our citizens. We will take the liberty of saying that we need greatly a school in our University of chemical science as applied to the arts, and especially to practical pharmacy, and we know none who are, by their large means and extensive patronage, better able to found and endow such a professorship, in connection with their laboratory, than the house of E. J. Hart & Co. Let us hope they will carry our this public spirited idea. There can be no branch of manufacture more useful to the South than this, more profitable to the owner, and none better adapted to the character of our climate and the demands of our customers.

Reliable Labor-Saving Machinery.—In the multiplicity of labor-saving machinery offered, since the war, to Southern mechanics and agriculturists, good workmanship and good material have too frequently been secondary considerations with both the manufacturer and the purchaser—the latter, anxious to obtain cheap and tolerably serviceable articles, and the former not indisposed, for obvious reasons, to supply such a demand. Now that abundant crops have placed the South in a fair way to prosperity, and she is beginning to command capital of her own, good policy and the best economy will dictate that cheap and ill-made agricultural implements, and foundry, and workshop machinery are more costly in the end than those manufactured of the best materials, and in the most skillful manner; and these alone, we are convinced, will hereafter be sought for by our people.

Among the machinery manufacturers who can be safely recommended for the care they display in the choice of material, in the employment of none but the most skillful artisans, and the ingenuity, usefulness and finish of their machinery, is the firm of Wm. D. Andrews & Bro., at No. 414 Water street, New York. They take especial pride in their long established reputation for making machinery, invented and patented by themselves, and in the best manner, and of the best material.

The writer of this, during the course of a visit to New York, took occasion to visit the establishment of Messrs. Andrews & Bro., and was enabled to give it a thorough examination. About a hundred workmen are employed, who are capable of producing one engine a day, and other machines in proportion. A number of the workmen whom we questioned stated that they had been in the employ of the firm for many years—several of them for fully twenty years. The rule of the house is to select each workman, according to his skill in a certain branch and his aptitude to improve therein.

Messrs. Andrews & Bro. devote themselves to the manufacture, exclusively, of original patented inventions and the tools used in their construction. The most prominent and useful of these machines are

ANDREWS' CENTRIFUGAL PUMPS.

Fourteen sizes of these pumps are made, each of the utmost simplicity, and ranging in capacity per minute from 90 gallons to 40,000 gallons. They are portable; not liable to disarrangement; and pass without choking, or other detriment to the pump, large quantities of gravel, sand, etc. Requiring but little power to run them, and possessing great durability, they are peculiarly adapted to irrigation and draining lands. They can also be used to pump mud, corn, coal, tan-bark, paper-pulp, etc., and for saving wrecked vessels and cargoes. At the last

fair held in this city Andrews' centrifugal pump obtained the highest award—the diploma.

ANDREWS' FRICTION GROOVED HOISTERS.

Capable of lifting from 1000 to 25,000 pounds each, and made portable or stationary as desired, these hoisters occupy but little room; are light and strong; are perfectly noiseless; consume less power than ordinary hoisters, and are not liable to break or get out of order. Being changeable instantaneously, (without stopping the engine,) in order to run at different velocities without any extra strain or jerk on the machinery, they are especially valuable in establishments where various weights are to be raised or lowered. This celebrated hoister was awarded the diploma—the highest premium—at our Mechanics' and Agricultural Fair last year, beside obtaining the highest awards at the American Institute, and wherever exhibited in competition with other hoisters.

ANDREWS' SMOKE BURNING TUBULAR BOILER.

The advantages claimed for this boiler are of the first importance; simplicity of construction, lightness, compactness, great strength; facility for repairs; thorough and economical consumption of fuel; sufficient fire surface to transmit all the available heat to the water; thorough circulation of the water; ample provision for supplying dry steam; entire safety; and finally, abolishment of the "smoke nuisance." To Andrews' Smoke Burning Tubular Boiler was awarded the diploma, the highest award at our last Fair for the best steam boiler. We also learn that it has carried off the highest awards at all the fairs it has been exhibited at.

ANDREWS' OSCILLATING ENGINES.

Simplicity of construction and the absence of all unnecessary parts are among the advantages claimed for these engines. They require but little care, occupy but little room, are economical in first cost and in the consumption of steam, and require no special foundation or balance-wheel pit, being complete within themselves. All the sizes, up to 100 horse power, can be transported without being taken apart; and on arrival at their destination, can be put to work without the loss of a day. Whilst they are as strong and durable as engines of ordinary make having the same power, they weigh only one-tenth to one-fourth as much as these.

The firm have built nearly a thousand of these engines in the last nine years, and they are in use in every quarter of the globe.

In conclusion, we would urge all interested in improved machinery, to write to Messrs. Andrews & Bro. for their circulars, which furnish full details concerning these very useful patents. Every such application will be promptly and courteously responded to.—*N. O. Times.*